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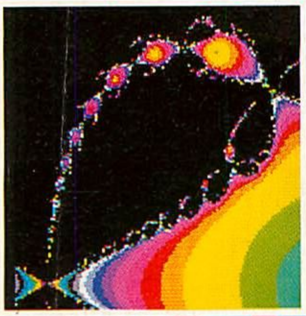
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ACORN USER

JULY 1986

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ROOT FINDER:
Maths made eye-catching

DISC SPECIAL

- AT LAST! 1770 CHIP REVEALED
- STARTING FROM SCRATCH
- EASY UPGRADE FOR ELECTRON
- WIN A VIGLEN WINCHESTER

WORD PUZZLES
Joe Telford's head scratchers

READER SURVEY
Answer back to win a printer



ACORN USER

ISSUE No 48 JULY 1986

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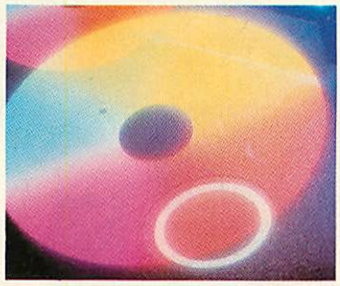
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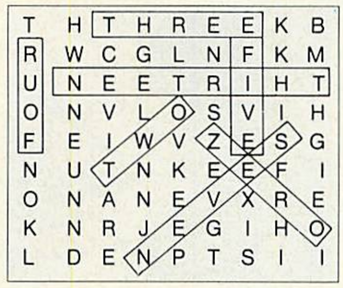
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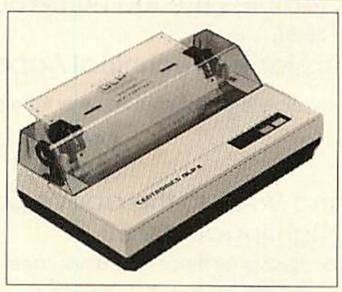
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Holiday slide shows: liven up your displays
Hard copy: get the best from screen photography

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NEWS

News in brief

● Micrograf has developed an innovative teaching aid using the BBC micro. The *Teacher Programmable Software Package* is a flexible question and answer student-learning system capable of being easily customised by the teacher.

The package consists of a master database driver program plus a range of 26 subject discs which include high resolution diagrams as well as text. The teacher can set up questions based on the diagrams. Subjects include geography, biology, mathematics, history and general science. The driver program costs £16.95 and the subject discs £4.50 each.

Micrograf, PO Box 17, Bracknell, Berks RG12 3NQ.

● Econet 86 is a one-day conference and exhibition on Acorn's network system. It will be held at the University of Bradford on 24 June. Contact John Geale on (0274) 733466.

● The BBC version of the best-seller *Thrust* will be released by Superior next month at £7.95. The Electron version will be on the second side, and it runs on the Master. Richard Hanson said it was company policy that all games would run on the Master, and *Citadel* had been converted, even though it probably would not pay.

Repton 3 will be released in the autumn with a screen and character designer built in.

● A new ROM from IFEL gives *Wordwise Plus* users more programming power. The *String Extension ROM* gives the user powerful string slicing commands, similar to those found in Basic, which can be used within segment programs. Not only do these new commands make the programs shorter and easier to write, they should also run quicker.

There are 24 functions on the ROM plus a disc of utilities. Details from IFEL, 36 Upland Drive, Plymouth PL6 6BD.

RISC is unveiled to select few

Acorn has unveiled its RISC super chip to a select band of potential customers and shown it off running Basic programs 50 times faster than a BBC micro.

RISC – which stands for reduced instruction set computer – is a 32-bit chip with benchmark timings faster than a VAX11/780 minicomputer.

Yet at an estimated $100 per chip it is cheaper than 32-bit processors in other micros.

Acorn has signed an agreement with VTI in California, which makes Acorn's other custom chips, to manufacture the chip for other computer companies to use in their products.

The Acorn RISC Machine (ARM) is being shown to a select few whom Acorn considers to be potential developers and customers.

The ARM comes as a second processor to a BBC micro with 4Mb of memory, although this is unlikely to be released as a product – it costs £4500. Software comes on disc, including Lisp, Prolog, C, Fortran, an assembler with utilities and version 5 of BBC Basic.

One of the lucky few to see the ARM told *Acorn User*: 'It looks the most exciting microprocessor I have ever seen, and you can appreciate its power by seeing it in comparison to a BBC. It really is 50 times as fast.'

Acorn's ARM team have used a graphics routine in demonstrations to draw a wire-frame 'blancmange'. The BBC alone took about 10 minutes – but just 14 seconds with the ARM switched on.

● And Acorn has developed a super-fast network system to help Britain stay ahead in the race with the Japanese and Americans to develop new supercomputers – the so-called 'Fifth Generation.'

The network is designed to carry voices, digitised TV, graphics and data as part of the Unison Project, sponsored by the £350 million Alvey Programme.

The Unison team includes Acorn, Logica, the University of Cambridge Computer Laboratory, Loughborough University and Rutherford Appleton Laboratory. Its main aim is to examine the office applications of networks.

Acorn has a lot of experience with local area networks (LANs), through Econet and the high-speed Cambridge Ring. Now it has prototypes of a new chip set – the Cambridge Fast Ring (CFR). This can handle data at 50 million bits per second – compare that with 1200 through a modem!

According to Logica's Peter Clark, the Unison project manager, its system will be so fast that, 'You will not know whether you're dealing with communications on site or over the network. It'll give local network performance over great distances'. Unfortunately it will be five to 10 years before it becomes a reality.

Data at hand

Seiko has updated its wristwatch terminals. At under £100 the new RC4000 comes complete with no less than 2k of memory and a miniature RS232 interface, allowing it to be connected to a range of micros, including the BBC.

Contact Hattori (UK) Ltd on (0628) 34655.



SJ's flexible file-server

A flexible Econet file-server system has just been announced by SJ Research. One of the main features of the MDFS Series is the choice of disc types you can use with it, allowing network owners to choose the storage medium to match their budgets.

Up to four floppy and two hard disc drives can be attached. There is also provision for a fast tape streamer. Dual spooling printer-servers and a real time clock are built in.

If you already use Acorn Winchesters on Econet, a conversion package is available. The system is Econet-compatible, with no need for a dedicated computer, second processor or monitor. Prices start from £1200. For details contact SJ Research at 108 Mill Road, Cambridge CB1 2BD. Tel: (0223) 69927.

THE MAN FROM U.N.C.L.E.

Surprise invitation to dinner round at Uncle Clive's last Tuesday. Small, select gathering of like-minded people. Wonderful cuisine and plenty to drink. After the meal, over coffee and Fisherman's Friends, the talk turned to business and Clive's dealings with the Beast of Amstrad.

I asked him point blank why he'd chosen to embroil himself with the purveyor of clockwork to the masses. His face clouded and tears welled up in his eyes. 'By God,' he sobbed 'the Fishermen's Friends ain't half powerful if you bite 'em. I think me toes have gone into spasm. Get me boots off quick and try and straighten 'em out.' A little skillful manipulation and the deft use of the poker eased things a bit and we returned to our conversation.

'Ackers,' he said. 'That's the top and bottom of it, ackers. Them whelks and black pudd'ns you've just been shovelling down your neck don't come free with two gallons of Shell!

'Anyway, I was getting brassed off with being ambushed by assorted creditors and their pet gorillas. It's time to walk tall again, buy a bag of porky skratchins whenever I want. Let The Good Times Roll. And I've got a great new idea for Sweety Pie Sugar – computerised bikes. Flat screen monitor on the handlebars. Tells you when you're going uphill so you know to pedal harder. And when you're coming down again it says 'STOP PEDALLING' so's your legs don't whizz round like mad.

'Anyroad, more ale, more porky skratchins, sing, sing! Ah'm a wild bull rider and ah lurve mah ro-day-oh . . .'

Happy days are here again.



Chris Scargill demonstrates dress pattern plotting with a Penman

New plotters from Penman

by Steve Mansfield

A small plotter is making a lot of noise in the world of computer aided design (CAD). The Penman plotter – a small, turtle-like device, carrying three colour pens – has been updated.

In fact there are three versions of the Penman II. The IIB works with paper up to size A3, the IID goes up to A1 and the IIE to A0.

There are also battery operated versions. These cost between £349 and £495. The standard plotters are being offered as packages. The Penman I costs £249 and the IIB is £395. The IID and IIE plotters come with a Penman I thrown in for £595 and £695.

To drive the plotter, Penman Products has produced a Data Plotting and Analysis package for the BBC micro costing £45. This takes information entered manually or through the analogue ports and allows it to be presented graphically.

As well as graphs the plotter is also used for designing clothes. Chris Scargill of Leeds Poly has developed software called *Figuring it Out*. This takes an individual's measurements and plots suitably adapted clothes patterns.

According to Scargill: 'During our tests at schools, we have found that it creates a lot of interest, particularly amongst the girls who can now see a practical use for computers.'

For details contact Penman Products Ltd on (0903) 209081.

Photos on Micronet

High resolution graphics and even photographs can now be viewed over Micronet, thanks to a new viewdata system.

Software for BBC owners, known as *Sketchcode*, allows access to special pages of high resolution graphics and digitised pictures. The software is free and can be downloaded directly from Micronet. This kind of system could be invaluable to estate agents, photographic libraries, or anyone who wants to supply pictures with their advertising.

For the time being, however, it will be used to provide illustrations for articles and news about the BBC. The software and pages will be available indefinitely, and the subjects covered should expand.

Keeping track of satellites

A new piece of software allows users to predict when two important weather satellites will be overhead. *Orbital Kinetics* predicts the occurence of weather satellites run by the National Oceanic and Atmospheric Administration (NOAA). Once found, people with the appropriate equipment can download information from these spacecraft.

Details are available from Rosemary Grace, MEDC, Paisley College, High Street, Paisley PA1 2BE.

Aries acquired

Watford Electronics has strengthened its place in the BBC market by taking over Aries, best known for its shadow RAM products. All Aries products, including the B20 and B32 RAM cards and the B12 ROM card will be sold by Watford in the future, alongside its own products.

The five figure deal, which includes the patents for the products and a retainer for Aries' boss Peter Headland, was reached after eight weeks of negotiation.

Watford Electronic's telephone number is (0923) 40588/37774.

In the club

Chipclub is a computer club for schools which aims to provide software, hardware and information about using computers in education.

Nearly 60 schools have signed up since Chipclub was launched last September and to date the club has produced two pieces of software, a magazine and a basic electronics kit for the Beeb – all included in the £42 a year fee.

More materials are promised, including teletext and temperature-measure software, and a control interface.

Contact Chipclub, Alpha Computer School, Ebernoe House, 33 Chesswood Road, Worthing, Sussex BN11 2AA.

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News in brief

● Robert Johnson is selling two pieces of ROM software – on disc! *Sidekick* and *Keyboard Utilities* are both ROM images designed to run in sideways RAM. The first is a sideways RAM toolkit written for the Solidisk SWR system, with 21 star commands. The second item allows whole strings to be generated by single key presses. The programs, on 40- or 80-track disc, sell for £5.50 and £4.50 respectively. Contact Robert Johnson, 29 Pretoria Road, Cambridge CB4 1HD.

● Following our report of an Ample user group in Holland, here's the address of a similar group closer to home: Ample User Group, 18 Blackmead, Orton Malbourne, Peterborough PE1 2PU.

● A package from Proteus brings recording studio power into the home. The Performer is a combination of MIDI interface and software which links up with any MIDI-compatible synthesiser to provide eight-track digital recording and editing. Price is £129.95, details 01-748 2302.

● Linkword has added to its range of foreign language software. The French, German, Spanish and Italian, previously available from Acornsoft on cassette only are now being brought out on disc and have been joined by Greek, Dutch, Russian and Portuguese. Each costs £24.95 and are available from Access Software Ltd, on 01-935 1470.

● Two former senior Acornsoft employees have set up software consultancies.

David Johnson-Davies, who was managing director, has set up Human Computer Interface, specialising in publishing and marketing software. Rob Macmillan, former business software editor, now trades as Cambridge Software Consultants offering contract programming for the Beeb and other micros.

HCI, 1 Brunswick Walk, Cambridge CB5 8DH. CSC, 30 Redgate Road, Cambridge CB3 0PP.

Start a network for just £650

Users can link their computers, and share peripherals, without the need for special interfaces using a new type of local area network.

Real Time Developments makes the Clearway networking system and has introduced an entry level package, which will link three devices, for just £650. The system operates via the RS232 or RS423 port. This means that the computers in the network can be completely different machines.

The network is easily expanded, up to a maximum of 99 devices. These can be computers or printers. To send and receive data, the micros must be running terminal emulation software. The data sent out by the computers is packet switched – the network nodes handle the business of dividing the data into the packets and controlling where it goes.

File serving, using a central hard disc, is not catered for. Normally serial printers will be used, but RTD is also producing a parallel printer converter.

Contact Real Time Developments at Lynchford House, Lynchford Lane, Farnborough, Hampshire. Tel: (0252) 546213.

CTS card of many colours

A new hardware and software system gives Beeb-based artists access to 4096 colours. Control Tele-Systems (CTS) has launched *System 500*, which includes a special colour card. This produces the 4096 colour shades, any eight of which can be used together on a mode 2 screen. What's more, the card uses two main palettes, and you can change from one to the other half-way down the screen, effectively allowing 16 colours to be on screen at once.

The colour card plugs into the 1MHz bus and the RGB monitor socket. *System 500* also comes with a high resolution graphics tablet and software on EPROM.

The software provides all the most useful graphics facilities, including sprite designing, pattern and flood fills, some special effects and gives a high level of control over the colours.

The *System 500* package costs £595 plus VAT. The colour card giving the full 4096 colour shades is available separately at £99. And for the same price you can get *The Artist*, consisting of the graphics software on EPROM and a mouse, but not the colour card.

CTS Recognition, West Road, Fishergate, Portslade, Brighton BN4 1QH. Tel: (0273) 420897.

Oxford Pascal now Econet compatible

Systems Software is taking a determined stab at the education market with Oxford Pascal. This updated version is fully compatible with the Econet networking system.

It's capable of compiling large and complex programs in memory or to disc. The company claims the software has been recommended by the Open University for one of its computer course modules.

The basic cost of the software is £49.95 for a 40- or 80-track disc or £24.95 on cassette. Educational users can obtain the disc version for £37, and Econet owners pay £43 for the master copy plus £20 per station, with a minimum of four stations.

Contact Systems Software, Worcester Place, Oxford OX1 2JW. Tel: (0865) 54195.

Micro help for the handicapped

Wooden 'bash' switches are losing out to the BBC micro in teaching the disabled, says Nick Pronger of Bradford Activity Toys.

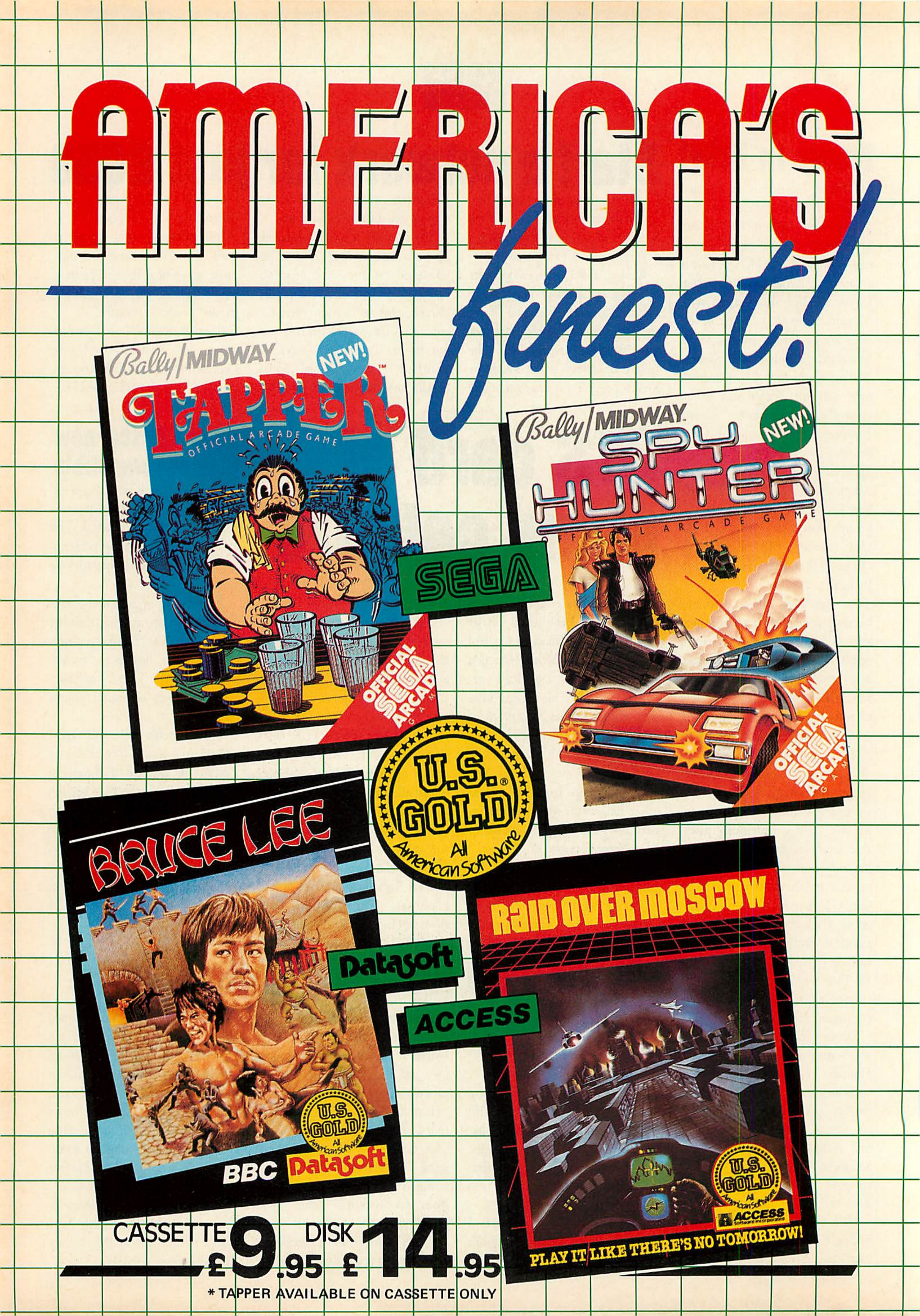
Nick started out by building wooden toys to stimulate multiply-handicapped children and has since moved on from wooden switches to the micro and infrared beams. The latest move is into programs.

He was originally a teacher: 'I got very frustrated as I couldn't use the computer with handicapped children because of the keyboard, so I developed wooden switches. Now it's gone from simple toddler games to word-processors operated by switches.

Programs from Bradford Activity Toys cost £9.50, with hardware starting at £5. A new catalogue can be ordered with a stamped self-addressed envelope from 103 Dockfield Road, Shipley, West Yorks BD17 7AR.

● Two sources of information on hardware and software for the handicapped are the Handicapped Persons Research Unit and the Disabled Living Foundation. HPRU keeps a database and will do searches for a minimal cost, although the subject must be as tightly defined as possible. The DLF has a list of computer accessories which costs 80p, and is free to the disabled.

HPRU is at Newcastle-upon-Tyne Polytechnic, 1 Coach Lane NE7 7TW. DLF is at 380 Harrow Road, London W9 2HU.



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Duelling Beebs in twin micro Phantom game

Doctor Soft has produced the first multi-user flight simulator for the BBC micro and Electron.

Double Phantom uses two micros linked together, allowing you to dogfight with a friend – or should that read enemy?

The software works with any two BBC micros, so you could have a Master on one side and a model B on the other. The computers are linked via the user ports using a hardware device supplied in the package.

On screen you see fast 3D vector graphics, showing the instruments, the view out of the cockpit and your opponent's aircraft (if you're good enough).

The program has been put together by Nick Brown, who has experience of military flight simulators, and Roger Selby, who is normally found behind the control panel of a British Airways TriStar.

The complete package consisting of disc and hardware link costs £19.95. Details are available from Doctor Soft, PO Box 66, East Preston, West Sussex BN16 2TX. Tel: (0903) 776000.



This is your Captain, Roger Selby, co-author of *Double Phantom*

Knitting micros

Knitting patterns on the BBC micro have arrived! A program called *Softwear* from Newsight was launched at the Master Knitter Championship held at Wembley last month.

Softwear comes on disc with three parts covering pattern design, fitting the pattern to a standard jumper shape and then dumping it to Epson-compatible printers as a row-by-row stitch guide for hand knitters or as a grid for machine users. The program costs £49 (plus postage), and Doreen Davies of Newsight sees most sales coming from schools and colleges.

In *Softwear*, there are four ways of designing a pattern. In the first, the computer generates a random pattern; for the second, wave patterns are set up which can be controlled to some extent; third, a design can be drawn up from scratch (or patterns from the first two stages edited); finally, repeating shapes can be built up in a similar way to laying tiles.

Once a pattern is developed, the shape of a crew-neck jumper is overlaid and fitted to the pattern. At this stage, the program checks that the design is not too crude or fine for the weight of wool chosen, and the result can be previewed as a check.

Newsight is at Reliance House, 340 Clapham Road, London SW9 9AT. Tel: 01-627 3148.

Competition winners

The large number of entries to the March competition showed that many of you were keen to win one of the three *Micro-Prolog* prizes. However only 66 of the entries were correct.

Many of you fell down on the question of *View* being a language – it is, although a common answer was no, it's a wordprocessor! Another tough one was the common algorithmic language. Lots of readers put ALGOL, when in fact it is COMAL – the answer was in the question!

The three lucky prize winners drawn by Dear Kitty, were:

P Harrison, Lichfield, Staffs.
S James, Bracknell, Berks.
G Shaw, Chelmsford, Essex.

For the record, the correct answers were:

1 Artificial Intelligence
2 Basic Combined Programming Language
3 Forth
4 Yes
5 Logo
6 Compiled
7 Comal
8 Lisp
9 Operating System
10 No

POST A PROBLEM

AS a result of pressure from readers, *Acorn User* now guarantees a fast reply service for enquiries. Your answer will be returned within 10 working days for just £2 (includes VAT), or your money back.

The idea is simple. Just write out your problem, fill in the coupon (right), and send both off to *Acorn User* with a stamped addressed envelope and cheque or postal order for £2. (If you want recorded delivery, add the cost of this on. The same goes for overseas readers.) Include as much detail as possible and a disc or cassette if a program is involved – with enough space to record any corrected listing.

We will then answer the problem and return all material received – within a guaranteed *10 working days* from receipt. If we fail to match this promise your cheque or postal order will be returned with the answered question. If we cannot answer the problem, the cheque will be sent back to you.

If you want a listing debugged, advice on hardware or software, or a list of addresses, send us your problems.

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Answered by:

News in brief

● MUD, the Multi User Dungeon run by BT and played over a modem, has a free account so adventurers can have a look – and die before they buy! The numbers are 01-998 8899 (1200/75baud), 01-997 9433 (300/300) and A21880100300 on PSS. Log on as 'mudguest' and use 'prospect' as the password for a 10-minute session. The game runs from 6pm to 8am during the week, and all day at weekends.

● Prestel has announced a one-third discount on time charges for colleges, polytechnics and universities which subscribe. Specialist education services include career and course guides, telesoftware, the electronic magazine School Link and Edit for teachers of information technology.

● RAMTOP, the radio amateur group covered in last month's article on packet radio by Tony Dennis has ceased trading. Readers interested in the subject should contact RSGB at Alma House, Cranborne Road, Potters Bar, Herts, or BARTG, PO Box 3, Llandeilow, Wales SA19 6EW.

● Commotion has set up an information centre for teachers showing robots and computer-controlled peripherals.

Managing director Tim Coote said that visitors could see for themselves what was available in the area of computer-controlled learning aids and discuss problems. Commotion stocks over 700 products from £5 kits to £10,000 robot arms.

Tim Coote explained: 'Teachers want to be able to look at all the robots, and they need detailed information. We have technical back-up at the centre and any teacher can ring us for advice.'

As well as ready-made products, Commotion supplies raw materials for classroom experiments, from balsa wood and glue to machinery needed for craft and design in technology.

Commotion can be contacted at 241 Green Street, Enfield EB3 7SJ. Tel: 01-804 1378.

See Samantha Fox strip at show

Martech – the personality games company responsible for such hits as *Geoff Capes' Strongman, Brian Jacks' Superstar Challenge* and *Eddie Kidd's Jump Challenge* – is to launch the BBC version of its *Samantha Fox Strip Poker* at the show.

We won't go too far into that, but change the subject to reveal that the company could well be previewing its big Christmas release.

Martech isn't making any promises and won't say what it is beyond a 'combat/strategy/arcade adventure game', which just about covers every possibility.

However, the game will feature a famous film and TV character and involves a licensing deal with the United States. So start working out who hasn't been done yet.

CDS will be showing its Blue Ribbon range of packaged budget



Eddie Kidd's Jump Challenge – is one of Martech's personality games

games, which go down a treat with Electron owners, according to the company.

Teachers and educationalists will be beating a path to the Logotron stand, where the PenDown educational word-processing package will be on display.

Aimed at 6 to 12 year olds, PenDown allows children to plan their own stories before putting finger to keyboard, and it also lets them create their own dictionaries. Various printer fonts are included and the software can even produce overlays for the Concept Keyboard. Price is £34 plus VAT.

Logotron has also reduced the price of its Logo software. Visitors to the Logotron stand at the Barbican can pick up Logo and the Advanced Logo extension disc for just £50.

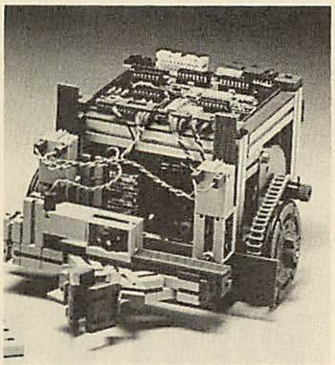
No less than ten companies at the show will be competing to sell floppy discs. Reflex, Centec, Rockfort, Zone Four, Cyro, Disking, Amten, Micromedia, Micro Resources and Direct Disk Supplies are the stands to watch.

● Floppy Aid is the latest Geldoff spin-off. Disc supply companies are banding together to give a penny to the Band Aid Trust for every disc they sell in August.

Buggy's new bits

Economatics, the company which makes the BBC Buggy, will be showing the diminutive robot fully equipped with a grab arm and a pen holder. The first peripheral converts it into a useful tool for teaching artificial intelligence, while the pen holder makes the robot turn turtle – or into a turtle.

Economatics (0742) 690801.



Save on Acorn User Exhibition advance tickets

The Fourth Acorn User Exhibition takes place at the Barbican Exhibition Centre, London starting on Thursday July 24 and running to Sunday 27.

Entry on the door is £3 or £2 for children, but you get £1 off if you buy your ticket in advance from Editionscheme. Micronet subscribers can save 50p by downloading a special *Acorn User* frame, which when dumped to a printer can be used as a discount voucher. A similar voucher will be in August's *Acorn User*.

Opening hours are 10am to 6pm – apart from Friday, when the show stays open until 8pm, and Sunday, when it shuts at 4pm. Thursday morning is trade only, and doors will open to the public at 1pm.

Contact Mark Simon at Editionscheme, HR House, 447 High Road, Finchley, London N12 0AF. Tel: 01-349 4667.

The Secret of LCL French

LCL is expanding its educational software range by moving into languages. *Micro French*, for the Beeb and the Electron, is to be released at the show. The package costs £24 and contains 24 programs on two discs (40 or 80 track) or cassettes, plus a manual and audio tape.

It is designed as a complete self-tuition course, taking students up to GCSE level, and covers the oral exam, vocabulary and verbs, and teaches you the kind of signs and instructions you are likely to come across in France. The emphasis is on practical learning, hence the audio tape containing spoken phrases which relate directly to the programs.

The software itself includes cartoon-style animation and, it is claimed, multi-tasking. And LCL also mentions that there is one very special and 'completely original' feature – but it's not telling anyone about it until the show!

Contact LCL at 26 Avondale Avenue, Staines, Middlesex. Tel: (0784) 58771.

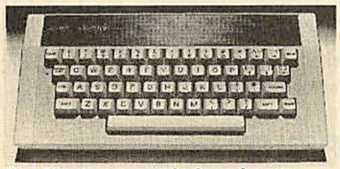
Electron booster betters BBC micro

PMS is promising to give Electron owners the speed and power of a BBC micro with twice the memory for just £89.

The company's 6502 second processor plugs into a cartridge slot on the Plus 1 interface and contains its own 64k of RAM. All the processing is done by the add-on, which speeds up the Electron and more than triples the memory for wordprocessing in mode 3 with *View* – and gives a massive 60k for machine code or data.

Gordon Cameron of PMS said the main target was *View* users: 'This second processor is the easy answer to the memory limitations of people running out of memory on *View* in mode 3, or when doing sorts and selects with *Viewstore*.'

He said that the drive should



The Electron – ready for a boost

work with all chip or disc-based software that conforms to Acorn's rules and uses the proper Tube protocols.

It had been tested with the *View* family of software and the Acornsoft languages – Prolog, Lisp, Pascal, Comal – as well as the BBC's *Ultracalc*.

BBC Basic, *View*, *ViewSheet* and *ViewStore* boast 29k of memory to the user in mode 3, three times the standard free space. The 'Hi' versions of Basic and *View* on disc give even more – 44k.

When running standard industry benchmarks, the device matches the standard BBC and cuts timings for an Electron in mode 0 by two-thirds.

It fits into a cartridge slot from which it also takes power, so there are no leads to connect. Cartridge software automatically runs with the extra memory.

The PMS-E2P will be launched at the *Acorn User* Exhibition along with a version for the BBC micro at under £100. This will use the Tube slot underneath the micro and comes with lead and ROM software.

It cuts BBC benchmark timings by about 30 per cent.

Contact PMS at 38 Mount Cameron Drive North, St Leonards, East Kilbride G74 2ES.

Atari at show shocker

Computer Concepts looks set to stir up a hornets' nest by showing an Atari 520 micro alongside its latest products, including *InterBase* and *InterWord*, for the BBC micro.

But Computer Concepts now favours the 16-bit Atari micros, which use the GEM operating system, over the Master series.

Managing director Charles Moir said: 'The reason for the Atari is that we're doing a Basic interpreter for it which we regard as a great piece of software so we're showing it off.

'However, it's also there to show people exactly what the 520 is and make them think "What is Acorn up to when there are machines like that around?" We want Acorn to sit up and take notice.'

Readers will no doubt make their own judgements.

InterWord will be on sale for the first time at the Acorn User Exhibition, and Charles Moir hoped *InterBase* would be there too, although he warned it would be tight. *Interword* will cost £49 plus VAT, although *Wordwise* owners will be given a one-fifth discount.

Next in the Inter range is a spelling checker, claimed to be the fastest on the market. *InterSpell* has a dictionary of over 50,000 words on a 128k ROM and will check a text file at the rate of 9000 words a minute. However, the release date for this depends on how fast the price of the 128k chips falls.

The program will also check every word as it is entered at the keyboard, without any noticeable loss of speed. There is even a *CROSSWORD command to help you cheat by filling in the blanks.

Also on show will be the *Speech System* text-to-speech processor. This consists of two ROM chips and converts words typed on the screen to speech, using a Texas Instruments speech synthesiser chip.

Unlike other speech synthesisers, the system accepts standard English words and phrases – they don't need to be converted into phonemes. The system can pronounce the vast majority of words correctly, according to Computer Concepts, but 50 difficult words – such as 'mortgage' have been built in.

Price is £39.90 for the two chips, plus £10 for the speech processor if required – though owners of the Acorn speech synthesiser will already have it. The *Speech System* does not work with the Master series.

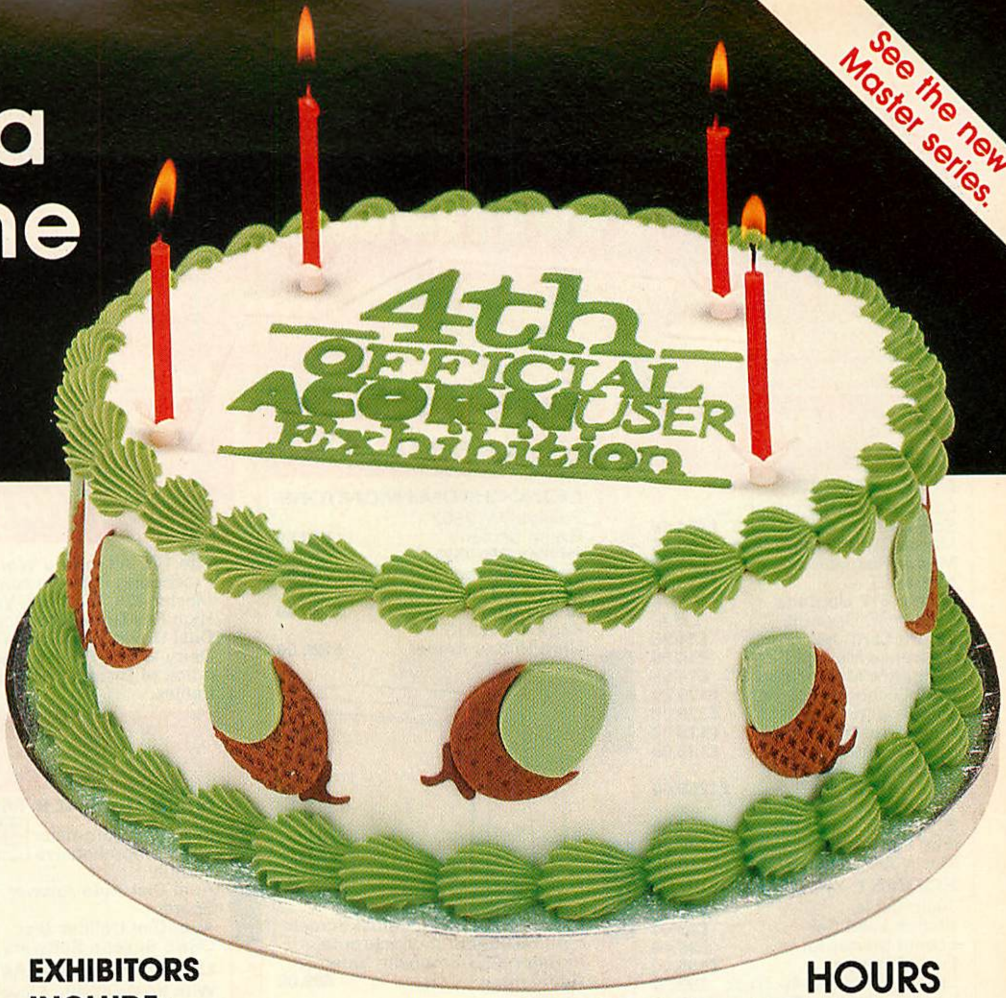
4th OFFICIAL ACORN USER Exhibition

Barbican Centre, LONDON EC2. 24th-27th July, 1986.

The following companies are set to attend the Acorn User Exhibition:

A & B Computing, Acorn Computers Ltd, Acorn User, ACP, Akhter, AMS, Amten Ltd, AVP Computing, Beebug, Bowthorpe, Bucon, Cambridge Electronic Design, Care Electronics, CDS/Blue Ribbon, Centec, Chalice, CJE Micros, Commotion, Computer Concepts, Computer Manuals, Cyro, Davis-Rubin Associates, Datapen, Direct Disk Supplies, Disking, Economatics, Encyclopaedia Brittanica, F-Soft, Fernleaf, Gemini, Grafsales, Griffen Computers, HCR Electronics, Hi-Tec Pens, HSV Computing, I O Computer Supplies, IRL Press, Kansas City Systems, LCL, Logo Software, Martech, Microaid, Micro Media, Micronet, Micro-Resources, Microworld, Miniature Tool Co, Minerva, Modem House, Norwich Computer Supplies, Opus, Overbase, Pace, Peartree Computers, Permanent Memory Systems, Ramco, Rams Computers, Reflex Magnetics, Rickett Educational Media, Rockfort, Shards, Slippery Slug, Slogger, Solidisk, Star Devices, Superior Software, System Software, Timestep Electronics, Twillstar, Viglen, Vine Micros, Walkbury, Watford Electronics, We-serve, Wigmore House, Wild Version, Zone Four

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By underground: Barbican, Moorgate, St. Pauls, Bank, Liverpool Street.

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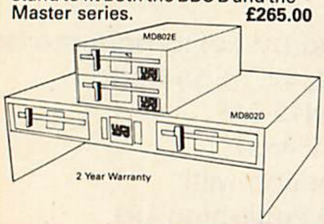
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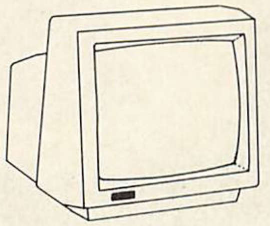
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In the free mode the command VT and FF code are read as a data fill end code. Of the two printers the data is automatically sent to whichever unit is free for service first. This means that the print time of a amount of data is minimized by using two printers without regard to the data list size.
NOTE: This means that if you try to print two reports at the same time, on two printers, the printers may intermix pages.

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The clear key mode is furnished for cleaning an error occuring during the printing and data input. The function is to stop the printer currently under operation and erase the copy count. However, only the last data input remains and can be reprinted by pressing the COPY key.

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1. A printer currently under operation is indicated by an LED, and therefore is immediately known.
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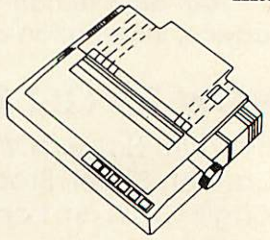
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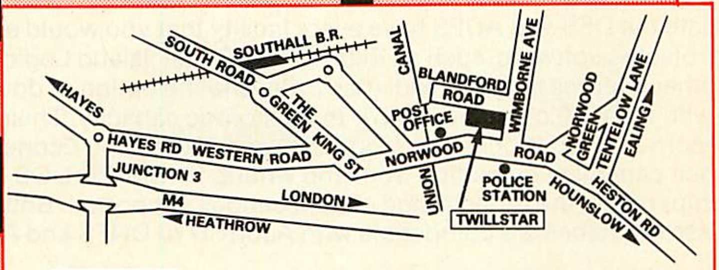
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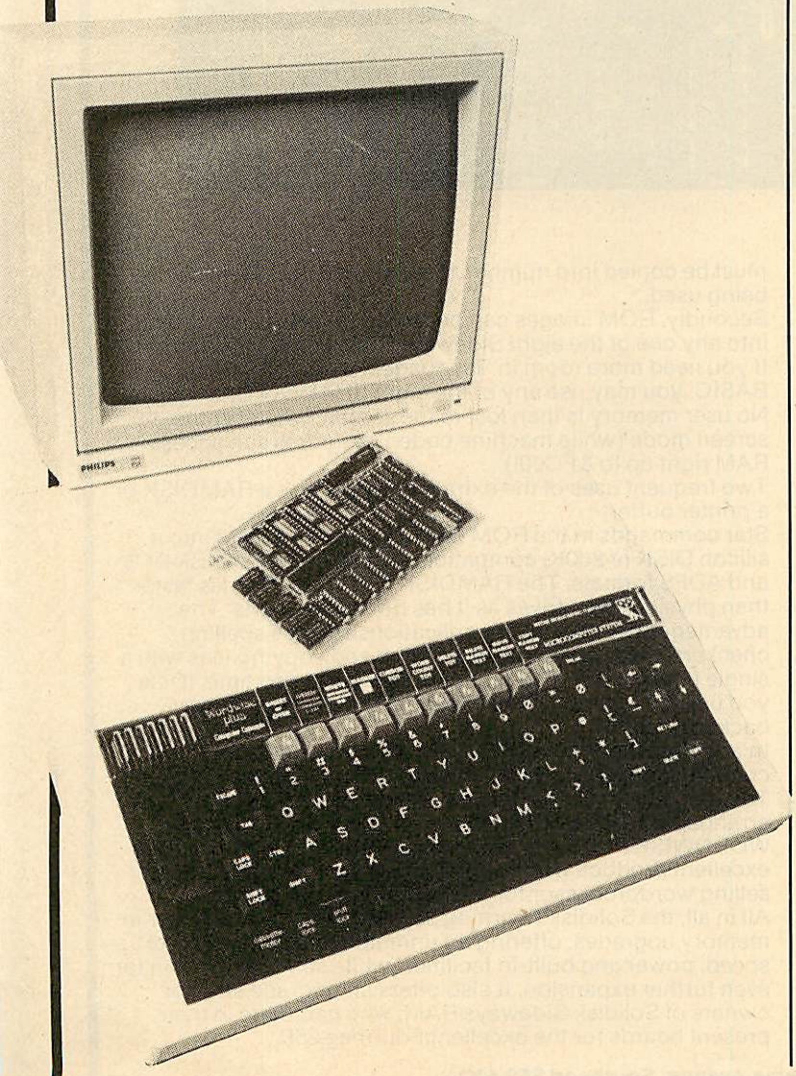
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SOLIDISK MEMORY UPGRADES

Solidisk memory upgrades for the BBC Model B offer excellent value for money. Their designs stand our for compatibility, speed, versatility and computing power. They use the latest component technology to achieve the lowest possible power consumption and size at low cost.

External ROM Cartridge

This comprises an adaptor which plugs into any ROM socket, and a blank cartridge which will accept one or two ROMs. These may be of 16K, 32K or 64K, depending on the capacity of the ROM socket holding the adaptor. This system is particularly useful for seldomly used ROMs, which are well protected by the cartridges. They can be installed and removed repeatedly without any risk to the ROMs and are compatible with Acorn cartridges.



Fourmeg CPU and ROM Expansion

The Fourmeg board plugs into the 6502 Processor socket, and two additional connections are made by sprung clips. It also provides one 64K and three 32K additional ROM sockets.

By adding faster memory and a 4MHz Processor, this board enables the BBC to run most programs in half the time. The new Processor is equivalent to that used on the Acorn TURBO board. It will run most Master software such as the new BASIC 4 and at twice the speed.
A switch selects between normal (2MHz) and fast (4MHz) speed. The higher speed is available to all ROMs and RAM installed in the Fourmeg board. The rest of the machine is unaffected.

Fourmeg Board with 32K RAM

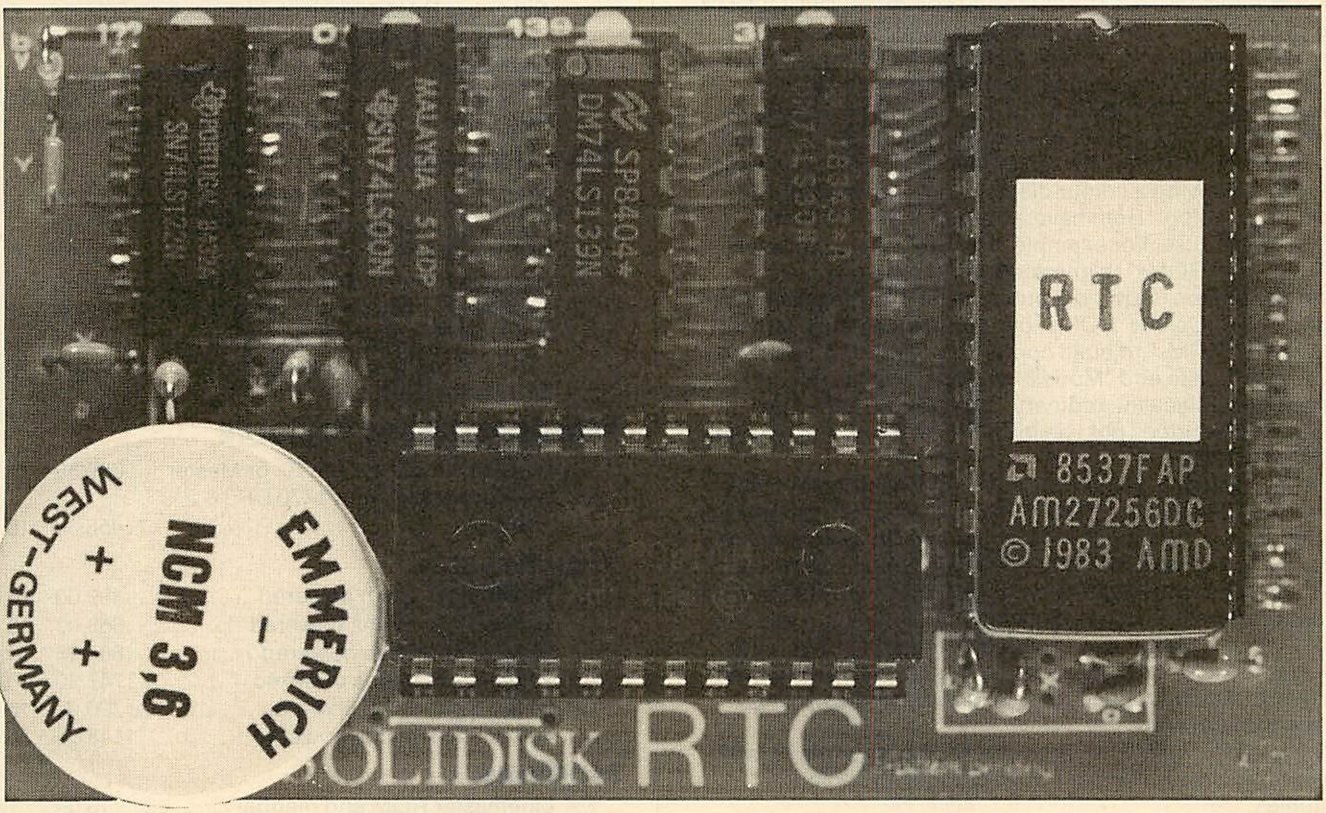
This comprises a Fourmeg board with 32K RAM and a 16K MANAGER ROM. This extra RAM gives Shadow RAM and Sideways RAM capability. Shadow RAM supports the screen in any mode, leaving all the machine RAM free. Sideways RAM can contain the images of two Sideways ROMs or used as RAMDISK or printer buffer. Shadow and Sideways RAM, and the four additional ROM sockets can be switched to the fast 4MHz speed.

32K, 64K and 128K Sideways RAMS

These are the most popular add-ons for the BBC Model B. You can start with 32K and upgrade later to 64K, 128K (and even 256K). The 64K and 128K RAM boards have two 32K additional ROM sockets.

Solidisk Sideways RAM boards are compatible with most add-ons except ROM boards — which they replace. Sideways RAM can run almost all software that is normally available in ROM. Solidisk has a large library of application programs. These include Word-processor, Spelling Checker, Database, Spreadsheet, Extended Basic, Sprites, Ramdisc, Printed Buffer, Machine Code Monitor etc. and more than 70 computer games especially written for Sideways RAM. The programs are available in three packs, each of 5 discs, in 40 or 80-track formats. Pack 1 is included with all Sideways RAM board. Packs 2 and 3 cost £10.00 each (£1.00 p&p). Pack 3 consists entirely of games and game design tools.

The STL RTC



The STL RTC (Solidisk Real Time Clock) is easy to fit: plug it into any ROM socket on the BBC Micro — and that's it. There are no wires to worry about and it's fully compatible with all BBC add-ons.

Switch on the computer and it shows itself as "STL Clock & Desk".

The hardware is an ingenious electronic circuit, employing the same "clock" chip as on the Acorn MASTER Series. It has the same time and date and many of the auto "CONFIGURE" features.

⋆CLOCK will show the time continuously in the top right corner of the screen.

⋆NOCLOCK turns it off

It will respond to ⋆TIME, ⋆FX141 and ⋆FX142, and Osword &E and &F. If you have BASIC 4, it will also respond to TIME$="date, time". Otherwise, you may use ⋆SETTIME instead.

Interesting results can be obtained even with simple programming:

10 REPEAT : UNTIL INSTR(TIME$,"07:30") ; PROCwake—me—up.

It will also set options for screen mode, BOOT, TUBE, keyboard repeat rate, sound level, disc speed, MODEM protocol, UNPLUG ROMs etc. on power up. ⋆INSERT will cancel the effect of ⋆UNPLUG.

⋆ROMS shows the names of all the ROMs in the machine.

⋆CONFIGURE issued on its own will list all options available.

If used with any of the options, it sets the machine accordingly.

⋆STATUS displays the current options.

The STL RTC also provides a desktop — with accessories — that you can use with an AMX MOUSE or a MARCONI TRACKER BALL. This is the fashionable "user interface" that everyone is talking about. With ⋆DESK, you can use the mouse to perform most usual disc operations — format diskettes, show disc directories, copy files, and run programs etc. It is compatible with both DFS and ADFS.

The accessories — a calculator and an appointment diary — may be "popped down" from the top of the screen, over any application program.

At only £29.00 inclusive of VAT, the Solidisk Real Time Clock is without doubt a fantastic purchase. It will add enjoyment and convenience to the everyday use of your BBC micro.

Gemini — BUSINESS DISK

INTEGRATED ACCOUNTING SUITE

INTRODUCTION

Designed for the small to medium sized business user, where speed and efficiency are vital, Gemini Integrated programs are suitable for sole traders, partnerships, or limited companies. All require a BBC B 32K microcomputer, and an 80 column printer. A double disk drive with an Acorn compatible DFS is required for integrated accounting purposes. A single disk drive may be sufficient where modules are used independently, although this is not recommended for the Sales Ledger and Invoicing module. The manuals indicate the system capacities for various disk drive combinations.

The programs have been devised by H.C.C.S Ltd in the light of substantial mainframe computing experience, and share many of the features normally found only in very large installations. Used in a typical business environment where invoicing, sales ledger posting, stock control adjustment and nominal ledger posting is simultaneously made, the software will convert the BBC micro into a business computer of enormous power, directly comparable with hardware/software combinations costing many times its price.

Each program is supported by a comprehensive, easily followed manual, and 'user friendly' screen prompts with error trapping routines, which make a specialised knowledge of accountancy unnecessary for the average user. All the programs, however, have many sophisticated features which make the programs revolutionary for the home micro market.

Gemini Marketing Limited confidently recommend the programs to serious commercial owners of the BBC B micro as software capable of making an enormous contribution to business efficiency and profitability at minimal cost, since it requires no expensive second processor in order to achieve the advantages of integrated accounting.

INDEPENDENT PRESS COMMENTS

John Vogler reporting in December 1984 edition of 'A & B Computing' said of Gemini Integrated Accounting when comparing to Peartree, Micro Aid, Software for All, Acornsoft Mirle and Sage:–

"This is the newest and most exciting. To have achieved a substantial degree of integration, very rapid file access and respectably large file sizes, without the use of a second processor, is a fine achievement. As one would expect from GEMINI, the individual modules are eminently professional and for the first time present the single processor BBC as a viable small business computer ... GEMINI have produced a superb product ... superb examples of the programmer's art."

INVOICING & SALES LEDGER

The Gemini Sales Ledger and Invoicing program will produce invoices and statements for customers and enable a tight control over credit procedures to be maintained by producing aged debtors reports, and by keeping current information concerning customer accounts.

The module can be used independently or interfaced with the Gemini Nominal Ledger and Stock Control modules, and offers the following advantages: • Maintains open-item sales ledger. • Comprehensive customer Master File maintained in memory. • Choice of fixed and free format invoices. • Integrates with Gemini Nominal Ledger and Stock Control modules. • Prints invoices, invoice copies, statements and credit notes. • Reports include: Aged Debtors, Sales Daybook Sales analysis by user defined code, VAT analysis, Audit trail giving copy details of all transactions. • Automatic updating of sales ledger. • Comprehensive accounting controls including period end close down routines and full audit trail for all transactions. • Examine customer status by file enquiry to screen or printer showing year to date activity. • Trade and settlement discount terms definable for each customer. • Caters for up to 5 rates of VAT. • Can hold up to 135 customers on 40 track disk system and up to 610 customers on a 80 track disc per Sales Ledger file. • Comprehensive analysis of invoices over unlimited, user definable sales codes. **Price £69.95.**

PURCHASE LEDGER

Used independently or interfaced with the Gemini Nominal Ledger, the program maintains a complete file for each supplier, records amounts outstanding at any time, helps to determine which invoices are payable, and payment dates for the claiming of discounts. Among this module's many features are the following: • Automatic posting of suppliers' invoices to Purchase Ledger. • Comprehensive analysis of invoices over unlimited, user definable expense headings. • Comprehensive accounting controls including period end close down routines with posting reports, and full audit trail facilities at appropriate stages of processing. • Full integration with Gemini Nominal Ledger module. • Purchase invoices and credit notes easily processed. • Supplier file held in memory, with full details of each supplier. • Maintains open item purchase Ledger. • Management of invoices due for payment within cash restraints. • Maximum number of suppliers on 40 track disk system of 135 and maximum of 610 suppliers on 80 track disk system per Purchase Ledger file. **Price £69.96**

NOMINAL LEDGER

This is the central module of the Integrated Accounting system and may also be used independently as a Cash Book or interfaced with the Sales and Purchase Ledgers and payroll programs. It includes the following main features: • 143 Nominal accounts all of which are user-definable. • Posting of transactions from Sales and Purchase Ledgers and Payroll modules. • Full Cash Book facilities. • Print out of full Trading and Profit and Loss Account and Balance Sheet together with notes to the accounts. • Full accounts may be produced for whatever period chosen by the user. • Comprehensive accounting controls including period end close down routines and complete audit trail for all transactions. • Journal feature for adjustments between accounts and correction of book-keeping errors. • Reports include: Account Master File showing complete code listing. Cash Book entry details. Journal printouts. Trial Balance. Trading and Profit and Loss Account with notes. Balance Sheet with notes. Audit Trail Enquiry for all accounts. • Account enquiry showing movements over the period under review including opening balance, period end adjustments and closing balance. • Account posting masks allow conversion of analysis codes set up in other modules into selected user-defined Nominal Ledger codes. **Price £69.95**

PAYROLL

This program provides a full range of controls over the different aspects of Payroll Accounting icluding tax and other deductions. It can be used independently, or interfaced with the Gemini Nominal Ledger, and offers the following facilities: • Employee file maintained in memory, containig: Name, address, sex, marital status, National Insurance Number and contribution type, date of birth, personnel number, department, date employment commenced, all applicable tax codes, whether week 1 or month 1 applicable, hourly or salaried, pay cycle, payment type (cash, cheque or direct transfer), PAYE reference number, previous name, bank details. • Supports weekly, fortnightly, four weekly or monthly employees. • Company master file containing: Name, address, bank account number and name, bank name and branch, PAYE reference. • Produces cash analysis of note and coinage to suit requirements. • Employee pay details include: Gross pay and tax paid to date both current and previous employer. National Insurance contribution for employer and employee. Five rates of overtime per employee. Up to 12 standard and 5 non-standard pay elements per employee. Basic pay. Hourly rate. • Reports include: Payroll reconciliation, Payslips, Coinage analysis, Cheque and bank giro list, Payroll masterfile, Departmental analysis. • Relevant data to complete Inland Revenue forms including: P11, P35, P45, P14/P60. • Maximum 98 employees on 40 track disk system and 198 employees on 80 track system per Payroll file. **Price £69.95**

STOCK CONTROL

A program providing full control over every aspect of stockholding operations which can be interfaced with the Gemini Sales Ledger and Invoicing program, this module includes the following features and routines: • Inventory Master File holding details of part number, selling and cost price, sales and product code, current stock, location of stock, allocated items, re-order level, quantity on order, current period activity and supplier code. • Permits four types of transactions – sales, returns, receipts and adjustments. • Part enquiry routines for any stock item. • Reports include: Part catalogue, giving stock sales and cost values. Re-order report. Evaluation stocks list, giving stock sales and cost values. Dormant parts report. Delete parts report. Stock usage report. Stocktaking sheet. Stock audit report sorted into part sequence and transaction type and date. • Screen prompt when item falls below the minimum re-order level. • Directly interfaces with Sales Ledger to enable automatic generation of product details for invoice production and adjustment of stock records. • Maximum 980 part numbers on 40 track disk and 1980 on 80 track disk per stock file. **Price £69.96**

NEW LOW PRICE

Price £69.95 Inc VAT + p&p per Module



Includes 1 year software support

PAYROLL (Stand Alone) £39.95

The 'Payroll' program was conceived in 1982, when the first BBC computer was being produced. It was decided that a program should be written which would run on the BBC B cassette machine with a printer, this being the minimum requirement to run a payroll and at an affordable price of £39.95. Naturally, Gemini have updated the system to take full advantage of the new versions of the BBC and the arrival of disk drives, without updating the price!

One of the many features of this package is a facility for the user to alter the tax and national insurance rates, which changes 3 times a year, himself.

The program uses all of the excellent facilities of the BBC such as colour displays, function keys, printer interface and fast processing. It also includes substantial 'error trapping' which virtually eliminates human error.

'Payroll' is fully 'menu-driven' avoiding the need to continually refer to the user manual. It is not protected thus enabling the user to make backup copies of the program and data for security.

Handling up to 50 employees, it displays Gross Pay, Net Pay and Overtime for Hourly, Weekly or Monthly paid employees. Payrolls are automatically analysed under departmental heads and the most frequently used PAYE forms, such as P4, P35 and P60, can be printed when required. It also maintains most PAYE and NHI data together with essential SSP Information. Typically the program would take about a morning to process a payroll of 40 employees and about 6 seconds to process one employee. An End of year routine is included which prints all of the totals and then zeros these ready for the next fiscal year.

Over the last 4 years 'Payroll' has been used by many thousands of employers and is particularly popular in education, since this easy-to-use program has proved ideal to teach students the fundamental features of a payroll.

(For those of you with a technical mind, the program has been written in fully structured BASIC, thus allowing easy modification for individuals).

STATUTORY SICK PAY PACKAGE £39.95

This business package has been specifically developed to meet the new and complicated SSP requirements recently introduced with effect as from 6th April 1986. The program has been especially written with the consideration of existing Gemini 'Payroll' users, ensuring similarity in operation and ease of use, thus providing an ideal compliment.

'SSP' will maintain up to 250 Employee Master Records (full or part-time), 99 separate SSP Records for an individual employee and 2250 SSP Records per disk.

Facilities include automatic assessment of SSP payments for any period to a maximum of 31 days, control of linked periods of incapacity to work (PIW's), automatic cumulative control of both SSP monies and number of weeks paid during the current financial year and latest (single/linked), PIW. The program issues a warning to raise SSP Termination SSP1 (T) and SSP Exclusion SSP (E) forms, a history recording and audit trail.

Printouts of the following are available: full file, selective SSP for individuals, SSP payments details for a selected tax pay period (for input to a payroll system), cumulative SSP details to date for DHSS P35 returns.

The program has password security, comes with a preparation utility for start of financial year and is not protected, thus enabling the user to make backup copies of the program and data for security.

DISK-BASED MAILIST £24.95

This powerful mailist program will hold up to 2000 names, addresses and telephone numbers. It provides many useful searching, sorting and printing facilities, even up to 3 labels across one sheet of paper.

'Mailist' uses Gemini's exclusive 'Searchkey' system, giving you the option of creating your own dedicated coding system for each name. For example, you could find all of the people who are eligible for a Christmas card this year!

This menu driven, simple and powerful program is ideal for business or home use.

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This offer means that Compshop has a number of second hand BBC 32K machines for sale, all with 3 months warranty. So if you want a BBC but can't afford a new one, phone us for prices and availability.

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REPLAY can effect a simple 'pause' or save a partly completed program to disc for later use.
REPLAY is 'encoded' in order that programs transferred to disc are individual to, and can only be run by, the same computer.
Get more enjoyment and action out of your software with the ***REPLAY*** System.

East to fit with no soldering, uses one sideways ROM socket with three simple connections in to the computer.

REPLAY **must be matched to the DFS IN USE:**

R8271 – Acorn 8271, also S.D Watford and Pace DFS.
R8272 – U.D.M. DFS
R8877 – Cumana QFS.
R1770 – Opus 3.45 DFS and Solidisk Issue 1.
R1770A – Acorn 1770 DFS and ADFS, also Solidisk Issue 2.
R1770B+ – for BBC 'B+ only.
R1770C – Opus Challenger only.
R1770W – Watford DDFS only.
R2791 – Opus 3.15 only.
R2793 – Opus 3.35 only.
(Acorn 'Master' in preparation).

Price £35.00 (incl. VAT), with full instructions for installation and use

Further details and reviews available

The Matrix ROM

The ***MATRIX ROM*** is an essential tool for Science and Mathematics Departments in schools, for Science, Computing and Engineering Departments in Universities and Polytechnics, and for anyone who writes serious programs for industrial applications. Written with the cooperation of the Civil Engineering department of Sothampton University.

The ***MATRIX ROM*** provides a comprehensive range of commands for performing matrix operations (including inversion). One of the many commands will solve a set of linear simultaneous equations, and another deals with sets of banded symmetrical equations. In addition there are commands for deleting and redimensioning arrays (to re-use valuable memory space), for finding maximum and minimum values in any row or column, and for inputting, saving, loading and printing arrays. All commands are executed in machine code much more quickly than is possible in ***BASIC***. Many lines of coding can be eliminated and much memory space can be saved.

These facilities transform the capability of the BBC Micro when dealing with tasks such as graphical transformations in two or three dimensions, or structural analysis, electrical circuits or vibration problems. In fact any problem where matrix operations or linear simultaneous equations are involved. The power of ***FORTRAN*** can now be combined with the simplicity of ***BASIC*** and the excellent graphics of the BBC micro.

Suitable for the BBC 'B', 'B+' and ELECTRON COMPUTERS

£36.00 (plus VAT), includes comprehensive Manual
Quantity discount offered to Educational Establishments
Further details available on request

New product "Master" Write-Protect Switch. A small module that fits inside the Master computer which enables you to write-protect the Sideways RAM banks. Available NOW priced at **£8.95** inc.

For further details or supply contact:
VINE MICROS, MARSHBOROUGH, NR. SANDWICH, KENT CT13 0PG. (Tel: 0304 812276)
or through your local Dealer

See us at the Acorn User Show on stand No. 25

REPLAY by Vine Micros

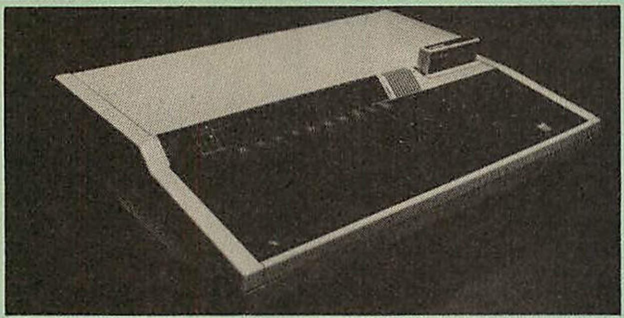
AA186

TECHNOMATIC

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305 Edgware Road, London W2 Tel: 01-723 0233

LEADING SUPPLIER TO THE BBC MARKET
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BBC MASTER SERIES



AMB15	BBC MASTER Foundation computer 128K	£395 (a)
AMB12	BBC MASTER ET 128K (only ANFS)	£319 (a)
AMC06	Turbo (65C102) Expansion Module	£102 (b)
ADF13	Rom Cartridge	£13 (d)
ADF10	Econet Module	£43 (c)
ADJ22	Ref. Manual Part I	£14.95 (c)
ADJ23	Ref. Manual Part II	£14.95 (c)
ADJ24	Advanced Ref. Manual	£19.50 (c)
	View 3.0 User Guide	£10 (d)
	Viewsheet User Guide	£10 (d)

UPGRADE KITS

1.2 OS ROM................£7.50 (d)
DNFS ROM...............£17.50 (d)
Econet Kit......................£55 (d)
1770 DFS Upgrade for Model B..£43.50 (d)
ADFS ROM (for B with 1770 DFS & B plus)..............................£26 (d)
64K Upgrade Kit for B plus £35 (d)

ECONET ACCESSORIES

Econet Starter Kit.............£85 (b)
Econet Socket Set.............£34 (c)
File Server Level I............£75 (d)
File Server Level II..........£210 (d)
Econet Bridge.................£174 (b)
Printer Server Rom...........£41 (d)
10 Station Lead set............£26 (c)
Adv. Econet User Guide.....£10 (d)

ACORN 32016 CO-PROCESSOR

Acorn Cambridge Co-processor combines with the BBC micro to provide full 32 bit processing. The National Semiconductor 32016 processor performs all language and application processing, the NS32081 floating point processor maximises the performance and provides support for IEEE standard fp handling.

The specially developed operating system PANOS, provides efficient interfacing between the languages and the hardware and software of the BBC micro incl. the variety of ACORN filing systems: DFS, ADFS and NFS. PANOS provides a variety of utilities including a full screen editor and a linker providing acces to both library routines and cross language linking.

FORTRAN 77, PASCAL and C languages with mainframe type implementations, fully compiled and provided with appropriate library support are included. Other languages include, Cambridge LISP with its compiler, a 32016 assembler and a 32bit interpreted implementation of BBC BASIC with full screen editor. 1 Mbyte of RAM is included as standard.

32016 CO PROCESSOR (Currently available from stock) £1130 (a)

Please phone or write for full specifications on the Cambridge Co-processor and Cambridge Workstation.

WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III is installed as standard on Acorn Winchesters. The non Acorn drive is fully compatible with the Acorn ADFS system or Torch Z80 system and offers good value for money.

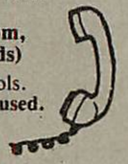
Acorn 10 Mbyte Winchester £1100 (a)
Acorn 30 Mbyte Winchester Drive £1630 (a)
20 Mbyte Hard Disc £1025 (a)

TECHNOLINE

PHONE TECHNOLINE 01-450 9764 FOR DETAILED SPECS ON THE MASTER SERIES & UPGRADES

TECHNOLINE offers you 24 hour, 7 days a week ordering/information
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Techno-Line 01-450 9764 24 hour, 7 days a week or 01-452 1500 (weekdays 7pm-9pm, 24 hours weekends)



Technical Information:
1200/75 Baud. Standard Viewdata/Prestel Protocols.
Please note that a 'Prestel' type terminal must be used.

Please phone for our latest Educational Price List.

EPROMs/RAMS

2764-25.........£2.00 (d) 27128-25.........£2.50 (d)
6264LP-15........£3.40 (d)

ACORN 2nd PROCESSORS

Acorn Z80 2nd Processor: Z80 CPU with 64K of RAM housed in a separate case with a integral power supply interfaces with the BBC computer through the TUBE. It converts the BBC into a CP/M system and its comprehensive package of software provides a suitable basis to set up a business system. £329 (a)

Acorn 6502 2nd Processor: This processor provides faster data processing speeds and larger memory. Particularly useful for use with Hi View word processor for production of large documents. £162 (b)

MULTIFORM Z80 2nd PROCESSOR

This processor converts your BBC into a power CP/M system and make it capable of operating in almost any CP/M format. Full details on page 5. £299 (b)

TORCH Z80 2nd PROCESSOR

ZEP100: This Z80 processor with 64K fits internally in the BBC computer and has the operating system in a ROM. It is supplied with the PERFECT suite of software comprising of a database, wordprocessor and a spreadsheet and a BBC BASIC for Z80. £229 (a)

TZDP240: ZEP100 with TECHNOMATIC PD800P dual drive with built in monitor stand. £469 (a)

ACORN TELETEXT ADAPTOR

This adaptor will convert the BBC computer into a teletext receiver capable of decoding and displaying the CEEFAX and ORACLE pages and the monitor screen. These pages can also be saved for later reference. BBC TV transmit educational software on their CEEFAX system which can be downloaded free of charge. £125 (b)

ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £278 (a)

ROBOCOM BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 192 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value.

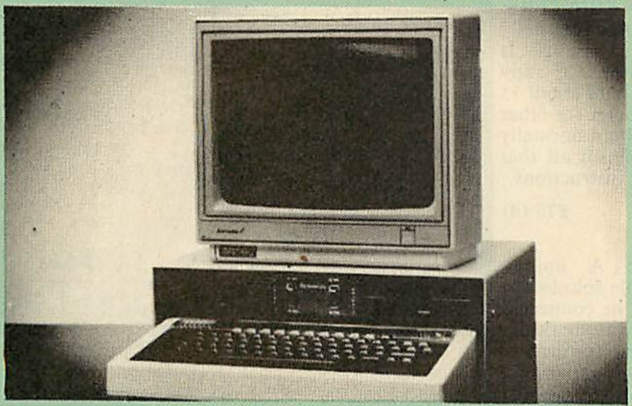
ROBOCOM BITSTICK I £299 (a)

ROBOCOM BITSTICK II: This package is as Bitstick I with software upgraded to allow scaling and auto dimensioning. Multiplotter driver is also supplied with the package. £775 (d)

Upgrade for Bitstick I to II £415 (b)
Bitstick Multiplotter Driver (most popular plotters included) £69 (b)
Epson FX80 Screen dump routine for Bitstick I £35 (d)
Epson FX80 dump for Bitstick II £39 (d)

DISC DRIVES

All drives listed below are fully compatible with single and double density DFSs. The larger capacity referred to below is for the Acorn's ADFS system.



Your computer installation can look like this with our PD800P drive

This highly successful drive offers unique features:

New slimline Mitsubishi mechanisms with ultra low power consumption (only 8 watts per mechanism), front locking lever and capable of single or double density operation. Ultra fast track access times and head settling times.

Fully compatible with the DFS and ADFS filing systems on the new MASTER's range.

40/80 switchable with switches located on the front panel. A generously rated switch-mode power supply ensures reliability with minimum heat dissipation for long periods of operation.

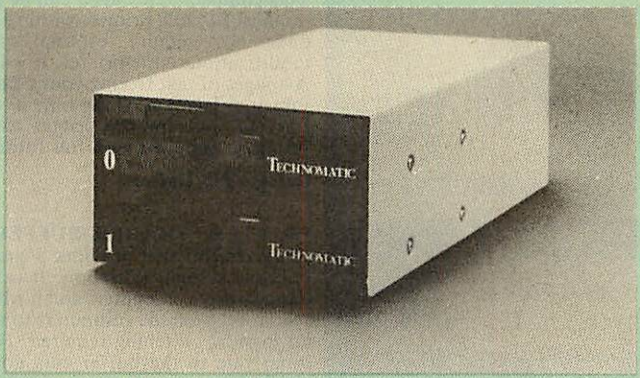
The mechanisms are set inside a sturdy monitor stand painted in 'BBC-matching' beige. Its 'looks' are enhanced by its black front panel, with attractive enamel-white markings.

These disc drives with a built-in monitor plinth provide a compact installation and give a professional look to the system.

As with all standard TECHNOMATIC drives it comes complete with a data cable, and a mains lead with a suitably fused 13A moulded plug.

PD800P 2×400K/2×640K 40/80T DS **£260 (a)**

PD800



TECHNOMATIC's stacked drives are housed in smart metal casings painted in BBC beige colour and are built to the same exacting standards as PD800P drives. The drives are fitted with integral switch mode power supply and supplied with a mains lead with a suitably fused 13A moulded plug and a data lead.

These drives are fitted with the new model MITSUBISHI mechanisms, which have been specially adapted for us to fit the 40/80 track switches on the front panel of the mechanisms. This would mean that the user no longer needs to grope at the rear of the drive to set the correct track setting.

PD800 (2 × 400K/2 × 640K 40/80T DS) **£240 (a)**

TD800 (as PD800 but without the psu) **£225 (a)**

TECHNOMATIC's single drives are also housed in metal casings painted in BBC beige colour and are offered with or without power supply. All drives are supplied with data cables and suitable power leads. Mains powered drives have a lead suitably fused with a 13A moulded plug.

1 × 400K/1 × 640K 40/80T DS

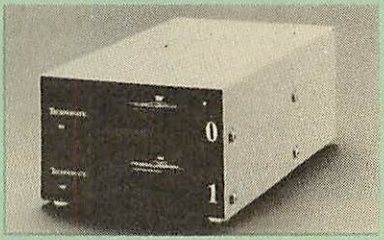
TS400 £109 (b) **PS400** with psu **£129 (b)**

3.5" DRIVES

These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives are offered with or without integral mains power supply and they are supplied with all the necessary cables to make them ready for connection to a computer. Mains powered drives are supplied with a lead with suitably fused 13A moulded plug.

1 × 400K/1 × 640K 80T DS : **TS35 1** £109 (b); **PS35 1** with psu £124 (b)

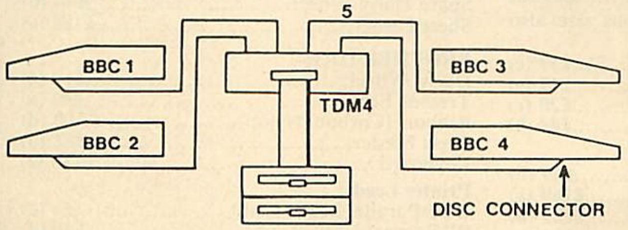
2 × 400K/1 × 640K 80T DS : **TD35 2** £199 (b); **PD35 2** with psu £219 (b)



TD35 2

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers) **£135 (a)**

TDM2 Dual Unit (2 computers) **£75 (b)**

DISC STORAGE BOXES

NON LOCKABLE	**DB530** 30 × 5¼"	**£6.00 (c)**	
LOCKABLE	**DB340** 40 × 3½"	**£8.50 (c)**	
DB550 50 × 5¼" **£9.50**	**DB570** 70 × 5¼"	**£11.00 (c)**	
DB5100 100 × 5¼"		**£13.00 6b)**	

3M 5¼" FLOPPY DISCS

40 T SS DD	£10.50
40 T DS DD	£12.75
80 T SS DD	£14.75
80 T DS DD	£16.00

(£1 extra for library case packing)

FREE SWISS ARMY KNIFE for every three packs of discs.

3M 3½" FLOPPY DISCS

80 T SS DD £18 (d) 40 T DS DD £25 (d)

Discs in packs of ten

Available at the new greatly reduced prices (for limited period only)

SPECIAL BULK DEAL

High quality **5.25"** with our usual lifetime warranty. The discs are packaged in a lockable plastic box.

50 Single Sided 40 track Double Density	**£42.50 (b)**
50 Double Sided 40 track Double Density	**£55.00 (b)**
50 Double Sided 80 track Double Density	**£65.00 (b)**

DRIVEHEAD CLEANING KIT

The **FLOPPICLENE** drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits. **5¼" £14.50 (d)**

Floppiclene with 20 disposable cleaning kits. 3½" £16.00 (d)

TECHNOMATIC

01-208 1177

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Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

EPSON PRINTERS

LX80 £195 (a) **Tractor Feed £20 (c)**

FX85 £315 (a) **FX 105 £449 (a)**

A limited no of FX80s available at £260 each.

LQ Range: This range with 24 pin dot matrix printers offers a high, 200 cps, draft speed and superb correspondence quality print at 67 cps and truly high resolution graphics and a variety of fonts.

LQ800 £495 (a) **LQ1000 £729 (a)**

TAXAN PRINTERS

KP810 (80 col).......................£230 (a)

KP910 (156 col)....................£379 (a)

NEW JUKI 5510 PRINTER

A new dot matrix printer from the reliable JUKI stable. Features include a fast 180 cps. NLQ at 40 cps. Full EPSON/IBM compatibility. 3K buffer as standard expandable to 15K. Full graphics capability and a variety of fonts including international characters set. Can be upgraded to a seven colour printer. Sheet feeder available as optional extra. **£229 (a)**

COLOUR PRINTERS

EPSON JX80 4 colour. **£420 (a)**
Integrex Colour Jet Printer. **£549 (a)**
Canon PJ1080A **£369 (a)**
JUKI 5510 colour upgrade. **£99 (b)**

CENTRONICS GLP

A NLQ printer at an affordable price. Fully compatible with Epson control codes offering a variety of fonts including super and subscripts, and a variety of graphic modes. Serial and parallel interfaces fitted as standard. Friction feed as standard. **£109 (b)** Tractor feed **£14 (d)**

DAISY WHEEL PRINTERS

BROTHER HR15: * 14 cps * 3 K Buffer * Two colour printing * Proportional spacing * Underline * Bold * Shadow print * Super/Sub script + many other features.
BROTHER HR15 **£315 (a)**

JUKI 6100: * 15 cps * 2K Buffer * Switchable 10/12/15 cpi * Proportional printing * Linear Motor for maximum reliability.
JUKI 6100 **£249 (a)**

DOTPRINT PLUS

The most versatile NLQ rom for the BBC Micro. DOT PRINT PLUS not only gives you the 10 character pitch at 6 lines/in with underlined and double width characters as required but unlike all other NLQ roms, it offers a lot more.

* a built in CHARACTER FONT EDITOR enables disc users to create their own type faces for using in printing spooled text files.
* a built in View Printer Driver.
* MICROSPACING for professional justification in VIEW and — with discs — in WORDWISE/PLUS.
* true BOLD PRINT in addition to double width.
* 12 char pitch as standard — providing 96 CHARACTERS PER LINE on the FX/RX 80 for example.
* simple control codes allow VARIABLE PITCH LINE SPACING in 1/72" increments and VARIABLE PITCH from 12 cpi in increments of 1/240". (10 cpi can be selected by a single control code).

Suitable for use with printers fully compatible with EPSON quad density graphics.

DOTPRINT PLUS for FX/RX and compatibles. **£28 (d)**

DOTPRINT Dual for MX Range. **£28 (d)**

PRINTER BUFFER & SHARERS

BUFFALO 32K Buffer for EPSON PRINTERS: This compact 32K buffer can be fitted internally on most EPSON printers within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions.

Buffalo 32K Buffer **£75 (d)**

PRINTER SHARER/BUFFER: A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

Available in 64K and 256K versions

TSB 64 £199 (b) **TSB 256 £275 (b)**

A Serial Buffer/Sharer will soon be available. Please send for details.

PERIPHERAL & COMPUTER SHARERS

An extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	£69(c)	£64(c)
4 Computers to a Printer	£85(c)	£74(c)
2 Computers/2 Printers x-over	£69(c)	£69(c)
BBC Cable Set 3 to 1 (1m ea).	£32(c)	£34(c)
BBC Cable Set 4 to 1 (1m ea).	£39(c)	£41(c)

BBC Computer Sharer: TCS26:
1 computer to 2 printers
fitted with Cable. **£19.50 (c)**

EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, eclipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer.

Detailed leaflet on request.

Epson HI-80 Plotter **£325 (a)**

HITACHI 672 PLOTTER

A high speed, compact A3 plotter with 4 colours and high accuracy. Both serial and parallel ports as std. Plots on either OHP film or plain paper. Operates on HP GL or single character commands and is easy to interface to most graphics software. **£465 (a)**

GRAPHICS PLOTTER

Available again with considerable enhancements to the original model. Plotting area has been increased to A3 size with a resolution of 0.1mm. Opto sensor converts the plotter into an input device to scan and digitise pictures, traverse mazes and investigate methods of artificial intelligence. A more powerful drill/router attachment and scriber provide facilities for drilling on various materials and fine line drawing on coated materials.

Total cost: **£629 (a)**

Basic plotter and accessories available separately. Send for details.

PLOTMATE

From Linear Graphics a range of fast, accurate and easy to use plotters.

The A4 Plotmate is the ideal drawing companion for all BBC micros, the Master and Cambridge Work Station. Plugs into the user port or printer port of your BBC Micro and directly driven by the BBC graphics commands in BBC Basic, Logo or indeed any high level language without additional driver software.

Plots onto paper, card or acetate film in up to 6 colours using fibre, OHT or ballpoint pens.

A4 Plotmate £299 (a)

A4M and the new A3M models plug into BBC and all leading micros. They run on a wide range of Linear Graphics and third party software. Numerous functions and add-on capabilities ideally suited to the requirements of the Education, Industry and Business environments including mathematical modelling, data display, CAD, mapping, optical scanning and PCB design.

A4M £399 (a) **A3M £549 (a)**

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces:

8143 RS232........................£28 (d)
8148 + RS232 + 8K..................£75 (d)
8165 IEEE + Cable..................£65 (d)
8148 RS232 + 2K....................£57 (d)
8132 Apple II......................£60 (d)
8177P NLQ for FX80 + /FX100 + ...£99 (d)

Parallel & Serial Buffers of various size also available.

FX80/80 + /85 Tractor Attachment........£37 (c)
FX80/80 + Paper Roll Holder..............£17 (c)
LX80 Tractor Feed.......................£20 (c)
LQ800 Tractor Feed......................£44 (b)

SHEET FEEDERS:

8338 LX80...............................£49 (b)
8333 FX100 + /105......................£169 (a)
8331 FX80 + /85........................£129 (b)
8330 RX80 + ...£129 (b)
LQ800..................................£129 (b)

Ribbons:

RX/FX100/100 + . FX105....................£10 (d)
RX/FX80/80 + , FX85........................£5 (d)
LX80.....................................£4.50 (d)
H180 Pen Set (Aqueous/Ball point).....£7.50 (d)

Dust Covers:

FX80.....................................£5.50 (d)
TAXAN/Canon KP810...........................£6 (d)
FX100........£7.50 (d) **KP910**...........£7 (d)

TAXAN CANON Accessories:

RS232 + 2K buffer.........................£78 (d)
Ribbon.....................................£6 (d)

JUKI 6100

RS232 Interfaces..........................£65 (d)
Tractor Feed.............................£129 (a)
Ribbon (Carbon)..........................£2.00 (d)
Spare Daisy Wheel........................£14 (d)
Sheet Feeder.............................£182 (a)

BROTHER HR15

Daisy Wheel...............................£18 (d)
Tractor Feed..............................£90 (a)
Ribbon (Carbon/Nylon)....................£3.00 (d)
Sheet Feeder.............................£182 (d)
Keyboard.................................£135 (a)

Printer Leads:

BBC Parallel Lead (1.2m)....................£6 (d)
BBC Serial Lead (1.2m)......................£6 (d)

Other lengths can be supplied on order:

IBM Parallel Lead (2m)....................£12 (d)

PAPER & LABELS

Plain Fanfold paper with micro perforations:

2000 sheets 9½" × 11"......................£13 (b)
2000 sheets 14½" × 11"..........£18.50 (£4.50)

Labels/1000:

Single Row 3½ × 1 7/16"..................£5.25 (d)
Triple Row 27/16" × 17/16"..................£5 (d)

MULTIFORM Z80

The MULTIFORM Z80 2nd Processor for the BBC Micro — opens the horizons of CP/M software to the BBC micro user

* Will enable running of almost any CP/M applications software
* Will enable transfer of data between different disc formats
* Emulates the two terminals most frequently used by CP/M software

MULTIFORM Z80 interfaces directly to a normal BBC micro requiring no hardware changes. It is supplied with OS/M operating system in rom which can run all software that obeys CP/M 2.2 constraints and its configuration is not hardware specific.

MULTIFORM Z80 is truly flexible and can be used with any BBC micro drive system, single or dual drive, 40 or 80 track format and single or double sided. Unlike other currently available Z80 processors for the BBC micro, there are absolutely no restrictions on the type of drive that can be used with the MULTIFORM Z80.

MULTIFORM Z80 plugs into the 1MHz bus connector of the BBC micro. It is mains powered and does not put any extra load on the BBC's psu. The data cable can be several feet in length, allowing convenient siting of the MULTIFORM Z80, unlike present second processors, which have 8″ cables.

Twenty eight CP/M formats are supplied which include: Acorn Z80, RML 380Z and 480Z, Torch (read only), Osborne, Televideo . . . we also offer to configure other formats at an extra charge."

Rom based OS/M operating system is fully compatible with Acorn's single and double density disc interfaces. Installing the OS in rom allows more space on discs for programs and data and response to system commands is very fast. (Note: Single density DFS will only read/write to single density CP/M formats).

MULTIFORM Z80 can format, read or write from a very wide range of CP/M disc formats. On a dual drive system, the drives can be set up independently to run two different formats at the same time. This will enable:

* The user to buy software from a very wide range of suppliers without having to worry about the type of format supplied.
* Interchange of valuable data and files among users of various CP/M computers.
* Using a system at home for preparing data required in the office.
* Software writers/developers to write software in any one format and transfer it to any other format without having to pay for expensive porting charges.

MULTIFORM Z80 is supplied with a library of a number of popular CP/M formats and a utility disc containing a program for creating files for the additional formats. Each library can load 32 formats and there are no restrictions on the number of librarires that can be created.

The utility disc also contains a program to interconvert ASCII texts wordprocessed on a normal BBC and under OS/M or CP/M.

MULTIFORM Z80's terminal emulation includes the ADM-3A, the HAZELTINE 1500 and the BBC VDU making the installation of most of the well known CP/M software easy.

MULTIFORM Z80 converts your BBC computer into an almost universal CP/M machine and adds the power of being able to run two different formats simultaneously, which currently is possible on only the very sophisticated specialist machines.

For any one working or intending to work in a CP/M environment, MULTIFORM Z80 is an indispensable tool.

In offices where there are a multitude of CP/M machines and a few BBCs, MULTIFORM Z80 will prove to be invaluable for transferring data between the various CP/M machines.

MULTIFORM Z80 (including utility disc, library disc and manual) **£299 + £4 p&p**

(When ordering please specify the type of DFS, MULTIFORM Z80 will be used with)

SPECIAL MULTIFORM UTILITY to read and write to IBM PC Disc. **£49 (d)**

CP/M SOFTWARE FOR TORCH & ACORN Z80 PROCESSORS

We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors. Phone for details on prices for popular packages for IBM

Please phone for our new professional software catalogue

WORDSTAR PROFESSIONAL The advanced word processing package comprising of WordStar, MailMerge, StarIndex and SpellStar, a total combination offering substantial savings on individual prices. WordStar is the best selling word processing program on the market. Extensive operator aids include a comprehensive friendly manual, step-by-step training guide, command cards, on-screen menus. Spellstar checks text files against its 20,000 word-plus dictionary. You can both add to the dictionary and create specific supplementary ones. Mailmerge is ideal for mailing applications. It enables the fast production of personalised form letters, mailing labels, invoices, etc. StarIndex creates alphabetical indexes, tables of contents, paragraph numbering etc.

WORDSTAR PROFESSIONAL £310 (a)
WORDSTAR £275 (a) WORDSTAR Upgrade to W/S Prof £195 (a)

DBASE-II Undoubtedly 'The Database', can be used for an almost limitless number of business applications, ranging from mailing list preparation through to running accounting ledgers and payrolls. An on-disc tutorial takes you from setting up a simple file all the way through to setting up custom screens and reports. Automatic calculations may be performed on data. Fields or entire databases may be modified or replaced with single, English-like basic commands; Dbase-II can therefore be used by general personnel having no programming knowledge. It can be tailored to suit a variety of professions and individual needs, with files such as accounting, payroll, time billing, job costing, scheduling and mailing lists. It can access several files at a time. It is fast, flexible and powerful. **£310 (a)**

SAGE ACCOUNTS: This package has been designed for the smaller business, for the user who is unfamiliar with computers but wanting or needing to computerise the bookkeeping and accounting functions. Sage is easy-to-learn and easy-to-use and is complete with a full tutorial booklet and a free manufacturers 90-day 'Hot-Line' support. It is a truly integrated package (all on one disc!) and covers Sales, Purchase & Nominal Ledgers, with a capability of handling up to 999 accounts per ledger. It will handle all your Sales and Purchase invoices and can easily generate account & management reports. **£375 Sage plus (£695)** for the larger business, and **Sage Payroll (£195)**

Other packages available include PRO-PASCAL, CIS-COBOL, Supercalc II, MACRO-80 etc. Please telephone with your requirements.

A.T.I. Trainers — these superb interactive training discs simulate the package being studied. A unique screen technique provides a friendly interaction — in the upper area, a faithful reproduction of the screen is displayed, while at the bottom, a series of prompts and explanations lead the student through the exercise. ATI trainers available include Wordstar, dBase-II, dBase-III, Multimate, Multiplan, Word at **£75 (b)**. Please phone for other trainers.

TORCH GRADUATE IBM SOFTWARE: We are able to supply most popular software packages including: WORDSTAR, WORD, EASY-WRITER, DBase-II & III, LOTUS-123, VISICALC, SAGE etc. Please telephone with your requirements.

PROFESSIONAL SOFTWARE PUBLICATIONS

Wordstar made easy	£16.95 (c)	Multimate Complete Guide	£16.95 (c)
Introduction to Wordstar	£17.95 (c)	ABC of LOTUS 123	£15.95 (c)
Wordstar Handbook	£11.95 (c)	The RS232 Solution	£17.95 (c)
dBase-II for the first time user	£16.95 (c)	CP/M Bible	£15.95 (c)
Understanding dBase-II	£22.95 (c)	Soul of CP/M	£14.95 (c)
Understanding dBase-III	£22.95 (c)	CP/M Handbook	£14.95 (c)
Multiplan Made Easy	£18.95 (c)	Mastering the CP/M	£17.95 (c)
		Computer Spreadsheets	£7 (d)

(no VAT on books).

TECHNOMATIC

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(b) £2.50
(c) £1.50
(d) £1.00

MONITORS

(All Monitors supplied with BBC Lead)

RGB MONITORS

1431 14" RGB Std Res	452 × 585 pixels	**£179 (a)**
1451 14" RGB Med Res	653 × 585 pixels	**£229 (a)**
1441 14" RGB Hi Res	895 × 585 pixels	**£375 (a)**

MICROVITEC 14" RGB/PAL/Audio

1431AP 14" Std Res	452 × 585 pixels	**£199 (a)**
1451AP 14" Std Res	653 × 585 pixels	**£275 (a)**

The above monitors are available in plastic or metal case.

MICROVITEC 20" RGB/PAL/Audio

2030CS 20" Std Res **£380 (a)** **2040CS** 20" Hi Res **£685 (a)**

TAXAN 12" RGB

K12SV3: A high performance high res monitor with desk matt screen with options to switch to monochrome green/amber. IBM Compatible **£324 (a)**

MITSUBISHI XC1404 14" Med Res RGB:
BBC/IBM Compatible. A new monitor with etched dark screen with both brilliance and contrast controls giving sharp graphics and text display. **£219 (a)**

MONOCHROME MONITORS

TAXAN

KX1201G 12" HI-RES green etched screen	**£90 (a)**
KX1203A 12" HI-RES amber etched screen	**£105 (a)**

PHILIPS

BM7502 12" HI-RES green screen	**£75 (a)**
BM7522 12" HI-RES amber screen	**£79 (a)**

ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)			**£20 (c)**
Taxan Swivel Base for mono monitors with integral clock			**£22 (c)**
Philips Swivel Base			**£14 (c)**
Monitor Stand. BBC B + B	**£10 (c)**	Master	**£12.50 (c)**
Double Tier Plinth. BBC B + B			**£19.50 (b)**
Taxan RGB Cable	**£5 (d)**	Microvitec RGB Cable	**£3.50 (d)**
Monochrome BNC/PHONO Cable			**£3.50 (d)**

TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational users. Supplied with a users handbook and utilities disc containing starter programs and development software.

Touchtec 501 **£255 (b)**

EPROMER II



A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.
Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

* Integral power supply ensures no power drain from the computer.
* Interfaces through 1 MHz bus, fully buffered.
* Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
* Eproms upto 16K (27128) programmed in single pass (27256 in two passes).
* Selectable programming voltage 25/21/12.5V
* Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
* User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
* Full screen editor with HEX/ASCII input.
* Data input from keyboard/Tape/Disc/Eprom.
* Software interface for integration of user's special requirements.
* Constant display of all options selected.
* Several BBC BASIC programs can be entered on a single eprom.
* Checksum facility allows for easy identification of programmed roms.
* Enter OS Commands from within the epromer program.

EPROMER II with Manual & Software on disc **£99 (b)**
ROM image of software supplied on disc for use with sideways ram.
ROM based software if required. **£5 (d)**

UV ERASERS

UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. **£59 (b)**

UV1B as above but without the timer. **£47 (b)**

PORTAL ROM EMULATOR

NEW

Real time evaluation of all listed eproms at 150 ns — hundreds of times faster than a typical eprom write/erase cycle (4Kbytes/sec, no erase time) — completely software driven (by Meta Assembler) — compatible with 'piggy-back' processors.

Don't blow an eprom each time you test your code on your target system! Use a PORTAL eprom emulator instead. Upto four independent PORTALS can be used on the same BBC lead. Each PORTAL has a length of cable with 28 pin header which plugs into the eprom socket you need to emulate — and thats it. All the rest is handled by META. Your code is sent down to PORTAL during assembly, with various options ie two PORTALS for 16bit data bus, sequential PORTAL skipping etc.

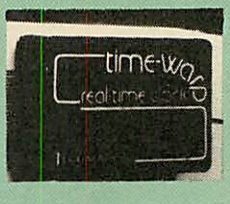
PORTAL is supplied in a custom steel case with 13 LEDs to indicate the state of its various functions. Comprehensive documentation and software are included.

Two versions of PORTAL are currently available.

PORTAL 128 (2716/2732/2764/27128) **£185 (b)**
PORTAL 512 (all above + 27256 and 27512) **£285 (b)**

Please send for detailed specification sheet

REAL-TIME CLOCK CALENDER



A low cost-unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as extensive software including a simple demonstration diary/planner application program on disc. **£29 (d)**

ROM/RAM EXPANSION SYSTEMS

ATPL SIDEWISE ROM EXPANSION BOARD A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sidewaysd rom expansion to 16 ROMs. One socket has been split into two 87K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board **£37 (d)** Battery Backup Kit **£18 (d)**

COMPUTER VILLAGE CV-16 Rom Board **£38 (d)**

A neatly designed, simple to instal board allows full sideways rom expansion on the model B. Two sockets for 8K CMOS RAM allow a total of 16K for which battery back is fitted as standard. **£35 (d)**

RAMROM-15 The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction. attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. No soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. Battery back-up fitted as standard. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. **£79 (b)**

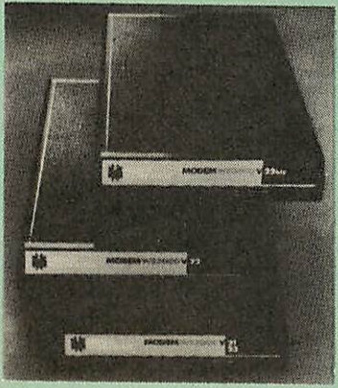
(Above boards are for use with standard BBC computer and not compatible with B plus unless specifically mentioned)

COMMUNICATIONS

MIRACLE WS3000 Range: * A new, professional series of intelligent modems with full auto dial and auto answer facilities as standard. * HAYES protocols are implemented allowing the use of a wide range of well proven communications software. 'Plain English' command structure simplifies the use of the modem even for the first time user. * All models feature a centronics compatible printer port allowing direct output to a printer. * A line sharing facility that allows WS3000 to differentiate between calls intended for data, and those for speech. * An intelligent speed buffered RS232 port and a wide range of available data rates makes this one of the most powerful multi speed range of modems available. * Line noise filtering ensures error free transmission and reception of data on long or noisy lines. * Internal battery backup allows storage of 63 names and telephone nos. * This range of modems can be factory fitted with high security data access protection system. * Models V2123 and V22 can be factory upgraded to V22bis standard giving a single compact modem capable of data rates from 75bps to 2400bps.

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them

WS3000 V21/23: This modem complies with the CCITT V21, V23 and Bell 103 standards and operates at CCITT standards for 300bps, 75/1200bps, 1200/75bps full duplex, 600bps and 1200bps half duplex, and the Bell standard for 300bps full duplex. **£295 (b)**



WS3000 V22: This modem operates on all V2123 standards plus V22 standard for 1200bps full duplex V22bis standard. **£495 (b)**

WS3000 V22bis: This modem operates on all V21/23 and V22 standards plus 2400bps full duplex. **£650 (b)**

BBC Data Cable for WS3000
£6 (d) Data cables for other micros available.

WS4000/'SCHOOLS' MODEM, a new low-cost high performance 'Hayes' intelligent modem with A/Dial and A/Answer and V21/23 at **£149 (b)**
A **V22** upgrade can be added at **£250,** and **V22bis** at **£405.** Other options, all priced at **£50** are battery backup, Bell standards, Call Monitor, Control port and Tone Dialling. Please send for full details.

NEW

MIRACLES WS2000 This highly successful world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possible gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique.
WS2000 £102 (c) Data Cable **£7**

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line **£30 (d).**
BBC User Port cable (for modem control) **£4 (d)**

WS2000 Auto-Answer Card £30(d).
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

SKI KIT (Allowing total control of the modem by your computer) **£10 (d)**

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling **£10 (d)**

GEC DATACHAT 1223 Modem: An economically priced BABT approved modem complying with CCITT V23 standard capable of operating at 1200/75bps and 75/1200bps and 1200/1200bps pseudo full duplex. It is line powered does not require external power source. It is supplied with software suitable for connecting to PRESTEL, Micronet 800, Telecom Gold and a host of bulletin boards. **£75 (b)**

SPECIAL OFFER

As reviewed in June issue of Acorn User
'Worthwhile and above all easy to use package'

COMMUNICATIONS SOFTWARE

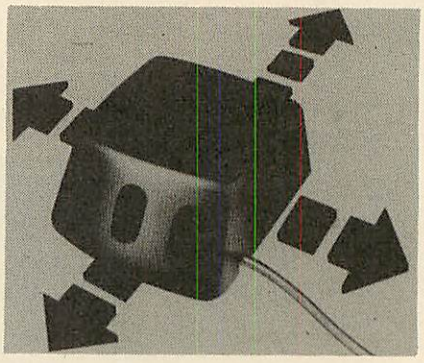
DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. **£24 (d)**

TERMULATOR An advanced terminal emulator on a 16K Rom. Emulations include VT52/100, Tektronix 4010 etc. Allows a BBC to be used as a terminal for almost any mainframe computer or computer network. **£25 (d)**

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£49 (d)**
RS232 Solution (Book) **£15.95 (c)**

COMMSTAR An ideal communications rom for both Prestel and bulletin boards. Facilities include Xmodem, clock etc. **£28 (d)**
RS232 Solution Book **£17.95 (c)**

AMX MOUSE with SUPERART



The mouse will now be available with enhanced software, the 'SUPER ART' which is compatible with 6502 2nd processor, the ARIES RAM board, BBC+ shadow mode, tape and ACORN DFS and ADFS. Allows full use of colour in mode 1. Disc users can create colour pictures in A4 size with dot pattern editing, use of icons, additional text styles, superb zoom in colour.
There is a variety of optional software to make the mouse one of the most versatile peripherals that can be added to the BBC micro.

AMX Mouse with Super Art **£67 (d)**
AMX Super Art Package on its own **£43 (d)**
AMX PAGEMAKER provides a high resolution A4 Typesetting and Artwork system. **£43 (d)**
AMX 3D ZICON will let you transform three dimensional vector data and translate them into 3D on screen graphics. **£21 (d)**
AMX DATABASE is a new filing system with 1000 records per file and unlimited number of fields per record. **£21 (d)**

Fleet Street Editor £38 (d)

RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package.
RB-21 (with 'icon artmaster'). **£59 (c)**

BBC COMPUTER SPARE PARTS

Complete Keyboard	£52	UPD7002	£5.00
Power Supply Unit	£52	DS3691	£3.50
Keyswitch	£1.75	7438	£0.40
Keyboard Connector	£4.00	74LSOO	£0.24
Video ULA	£18.00	74LSO4	£0.24
Serial ULA	£14.00	74LS10	£0.24
UHF Modulator	£4.50	74LS123	£0.80
6502A 2MHz CPU	£6.50	74LS163	£0.75
65C02 CMOS CPU	£12.00	74LS244	£0.80
6512AP CPU	£12	74LS245	£1.10
6522 VIA	£3.50	74LS373	£0.90
6522A 2MHz VIA	£5.50	74LS393	£1.00
LM3 24 op-amp	£0.45	8271	£46
SAA 5050-Teletext	£9.00	88LS120	£3.00
6845SP CRT Controller	£6.50	4464 RAM	£8.00
		O/S Basic B+	£25

All the above carry Carriage Code (d)

MERLIN

MERLIN is the ultimate utility ROM for the BBC and BBC PLUS (Master coming soon) — an optimum combination of the most useful, of Disc, Memory, and ROM management utilities. A total of no less than 57 essential commands ensure that this will be the last utility ROM you will purchase. It is suported by a 106 page comprehensive manual with detailed syntax, argument and error messages for each command, and all the utilities are fully 'Tube' compatible.

A selection of just some of the commands include:

APPEND — append Basic files
ARCHIVE — a unique disc/tape archive system
CDIS — a 6502/65C02 disassembler, also able to disassemble sideways
ROM/RAM and optional printer output.
CLONE — protected disc copier.
DBYTE — Disc byte search utility.
DSTRING — disc string search utility allowing localised string search.
DUAL/SWAP — allows second catalogue on disc for 60 files/side of disc.
EDSEC — an interactive disc editor, able to directly access sectors, read and write to sectors marked deleted, and editing of protected discs.
FORM — a formatter able to format all or part of disc.
GPACK/GEXPAND — an all-mode screen file compacter/expander enabling saving of upto 70% of screen memory.
MBYTE/MSTRING — memory byte/string search utility.
MEDIT — interactive memory editor.
REPAIR — atempts to recover data from a track and repair.
ROFF — disable a ROM.
SEDIT — interactive 'protected-disc' editor.
ZDUP — disc backup/format utility for ACORN & TORCH Z80 users.

As there are so many new commands, we have prepared a detailed leaflet describing all the commands — this is available on request.

MERLIN £37.50 (b)

FIRMWARE AND SOFTWARE

LANGUAGES

META-ASSEMBLER: For full details please see page 6 of this advertisement.

6502 DEVELOPMENT PACKAGE A Macro-Assembler with utilities for use with the 6502 2nd Processor. Enables the serious programmer to develop large programs in assembly language. £39 (d)

ACORN MICRO-PROLOG: The logic programming language seen as the language for programming in the future and used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more user friendly for new users. 16K Rom, manual and extension modules. £62 (c)

ISO-PASCAL Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. £47 (c)

ISO PASCAL Stand ALONE GENERATOR: Utility to convert programs produced using ISO PASCAL for stand alone applications. £28 (d)

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. £42 (b)

LOGOTRON logo £56 (c)

BCPL A full implementation of the BCPL compiler language consisting of the language of ROM, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. £42 (b)

BCPL CALCULATIONS PACKAGE Supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calcultion files, example files and a comprehensive user guide. £15 (d)

BCPL STAND ALONE GENERATOR £36 (d)

Acorn LISP Rom, Acorn FORTH Rom, Acorn COMAL, (each) £39 (d)

MICROTEXT A frame based authoring system from National Physical Laboratory for interactive computer tutoring. Disc based. Disc £49 (c)

OXFORD PASCAL A fast, compact P-Code compiler, that fully utilises BBC Graphics and sound, contains a powerful editor, and produces 'standalone' software. (Specify 40/80T) £35 (c)

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE..............£37 (d) **MASTERFILE II**......£17.00 (d)
STARdataBASE...........£49 (d) **GEMINI'S DATAGEM**..£59 (c)

WORD-PROCESSORS

VIEW........................£37 (d) **HI VIEW**....................£36 (c)
VIEW VERSION V3.0....£56 (c) **VIEW INDEX**................£9 (d)
VIEW PRINTER DRIVER GENERATOR.......................£8 (d)
VIEWSPELL..............£52 (d) **WORDEASE**...........£24.50 (d)
WORDWISE...............£25 (d) **SPELLCHECK III**.........£31 (d)
WORDWISE PLUS.......£42 (d) **INTERWORD**..............£49 (d)
EDWORD II..£42 (a)

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. £37 (d)

VIEWPLOT: A disc based Linear graph/barchart/piechart plotting program. £25 (d)

INTERSHEET The new spreadsheet from Computer Concepts. Many advanced facilities including 105 character display, several spreadsheets may be used at once, may be used with View & Wordwise etc. etc. £45 (c)

INTERCHART Graphics Package for the Intersheet. £30 (d)

ULTRACALC £39 (d) **QUICKCALC** £14.50 (d)

UTILITIES

ACCELERATOR.........£49 (d) **ACORN BASIC EDITOR** £24 (d)
BROM.......................£28 (d) **SLEUTH**......................£24 (d)
TOOLKIT plus............£31 (d) **EXMON-II**....................£22 (d)
HELP II......................£27 (d) **DISC DOCTOR**..........£26 (d)
DISCMASTER..£18 (d)
ACORN GRAPHICS ROM GXR. £21 (d) (specify BBC B or PLUS)
COMPUTER CONCEPTS GRAPHICS ROM..................£20 (d)
PRINTMASTER......... £25 (d) **DUMPMASTER II** ..... £26 (d)
FONTWISE............... £10 (d) **FONTWISE PLUS**........£16 (d)
HERSHEY CHARACTER FONT GENERATOR.............£18 (d)
ICON MASTER..........£29 (d) **STUDIO EIGHT**..........£19 (d)
BILLBOARD..............£18 (d) **CC SPEECH ROM**.......£28 (c)
ACORN'S CREATIVE SOUND.......................£15 (c) **CC TEXT TO SPEECH**................£34.70 (d)
ACORN'S SPEECH PROCESSOR ROM......£15 (d) **ROMIT**.......................£29 (d)
PROGRAM BUILDER..£18 (d) **REPLICA III**..............£12 (d)
DATABEEB................£24 (d) **COMMUNICATOR**......£49 (d)
COMMSTAR..............£26 (d) **TERMULATOR**..........£25 (d)
MINI OFFICE II.......£14.75 (d)

When ordering software on disc please specify track format (40/80)

BOOKS

No VAT on books; Carriage (c)

LANGUAGES:
6502 Assy Lang Prog............£19.95
6502 Programming..............£16.95
8086 Book..........................£23.95
Acorn BCPL User Guide........£15.00
Acorn FORTH......................£7.50
Acorn LISP.........................£7.50
S-PASCAL...........................£7.50
Acorn ISO Pascal Ref Manual.£12.50
Intro to COMAL..................£10.00
Intro to LOGO.....................£7.50
Micro Prolog Ref Manual.......£12.50
Creative Sound.....................£7.50
Introduction to Pascal...........£16.50
Prog the Micro with Pascal.......£8.50
The UNIX Book.....................£7.50
Unix User Guide..................£19.95
Understanding Unix.............£18.45

BBC MICRO BOOKS FOR BEGINNERS:
BBC User Guide Acorn..........£15.00
BBC PLUS User Guide..........£15.00
Drawing your Own BBC Programs £6.95
Introducing the BBC Micro......£4.50
Mathematical Programs in BBC Basic

PROGRAMMING/UTILITY
Advanced User Guide...........£12.50
Adv BASIC Rom User Guide....£7.50
Advanced Prog Tech for BBC...£8.95
Applied Ass./Lang on the BBC £9.95
BBC Micro Advanced Programming £9.95
BBC Micro Sideways ROM's RAM's £9.95
BBC Micro Sideways Roms B. Smith..........................£9.95
Guide to the BBC ROM...........£9.95
Exploiting BBC BASIC...........£6.95
Further Programming for BBC £4.00
Programming the BBC............£6.50
Structured Programming.........£6.50
Using BBC BASIC................£10.00
View 3.0 User Guide.............£12.50
Viewstore...........................£12.50
Viewsheet...........................£12.50
Word Processing on BBC (Wordwise + Epson)..............£5.25

SOUND & GRAPHICS:
Advanced Graphics with BBC...£6.00
BBC Graphics & Sound...........£7.50
Creative Sound on the BBC......£9.95
Graphics on the BBC Micro......£6.00

DISC DRIVE SYSTEMS:
Advanced Disc User Guide.....£14.95
BBC Micro Disc Companion....£7.95
Disc Book............................£3.50
Disc Programming Techniques..£7.95
Disc Systems........................£6.95

APPLICATIONS:
BBC Filing Systems & Databases £7.95
Business Programming on BBC £7.95
Business Applications on BBC..£7.95
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EDUCATIONAL SOFTWARE

We are pleased to announce that we now stock the full range of BBC Publications Educational software for the BBC computers. This software which is in many cases developed alongside radio and TV programs from the BBC Education Department, has all been tested in many schools, and by education experts to ensure the high quality one would normally expect from BBC. These packages supplement the class room learning by providing moving and colourful graphical displays which normally cannot be easily produced on the blackboard and help in ensuring clear understanding of a variety of subjects. The software has received wide acclaim from teachers, and in the educational press. All cassette programs transfer easily to disc, and all disc programs can be run on 40 or 80 track drives.

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ASTRONOMY
Aimed at the 9-12 age group, programs include Phases of the Moon, Eclipses, Seasons of the Year, Planetary Motions and Lander which is a gravitationally accurate game. All programs feature colour graphics — £12 (d)

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Four primary-level maths programs suitable for children of a wide range of abilities. Topics include symmetry, co-ordinates, and probability. — £9.50 (d)

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These further four maths programs are for the same age/ability range as pack 1, and cover similar topics, from different angles. — £9.50 (d)

NUMBER GAMES
Six maths programs designed to please the eye and stimulate the mind of any active and adventurous child aged 8 upwards. — EC £8.65 (d)

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A friendly and original introduction to computers using the computer synchronised audio technique. Written for a 8-12 year old but also suitable for any complete novice. Total of 80 minutes of audio material and 14 programs. — £26.00 (c)

WORD PLAY
An elegant but simple program to introduce primary school age children to the concept of word processing. Search, delete, justify etc have small animal icons associated with them. Fun manual for small children. — £10.75 (d)

DRAWSTICK — £8.50 (d)

SECONDARY LEARNING

ADVANCED LEVEL STUDIES: STATISTICS
Six programs covering the central concepts and principles of statistics. Topics covered are Discrete Data and Binomial Distribution, Continuous Data and the Normal Distribution, Hypothesis testing and confidence intervals, Central Limit theorem and Estimation, Simulations, Correlation and regression. — £25 (d)

ADVANCED STUDIES: GEOGRAPHY
Four programs examining aspects of social geography — traffic and town planning, drainage basin management and planning for industry. Users can alter the models. Details in the comprehensive manual. — £11 (d)

INSIDE INFORMATION
Designed to provide a basic introduciton to information technology for young people and adults. The course assumes no prior knowledge of the subject and is suitable for use in secondary schools, further education colleges, ITeCs and adult education centre. This software can be used alone, or in conjunction with the BBC's Inside Information radio series. — EC £11 (d)

OPEN LOGO
Developed by the Open University to provide a full implementation of Logo — the language of learning — for the BBC Micro. 2 × 16K ROMS and two detailed manuals (120pp and 300pp) — EC £61 (c)

SCIENCE TOPICS: WAVES
A secondary level physics program allowing the student to learn about waves by displaying waveforms on screen. Parameters can be altered and the results observed immediately. — £15 (d)

SCIENCE TOPICS: RELATIONSHIPS
A secondary level biology program giving a sophisticated simulation exercise for students, based on data from the World Health Organisation. You are malaria control officer for an African village, and you must use the right combination of drugs, pesticide and education to combat the disease. — £15 (d)

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A secondary level chemistry program designed to reinforce and strengthen students' concept of the bonding of elements. Transfer and sharing of electrons are both shown graphically. — £15 (d)

SCIENCE TOPICS: ELECTROMAGNETIC SPECTRUM
A secondary level graphical adventure designed to test your knowledge of the electromagnetic spectrum. You are lost in space, and you must build a radio, perform spectroscopic analysis etc. to complete the adventure. — £15 (d)

SCIENCE TOPICS: ELECTRONICS IN ACTION
A secondary level program about using computers for control. The pack gives three simulations of control systems. Control is achieved using a subset of 6502 assembly language. A program editor is supplied. — £15 (d)

SCIENCE TOPICS: NEWTON AND THE SHUTTLE
This secondary level interactive program in three parts follows the space shuttle from launch to recapture of a satellite in space. Students knowledge of Newtonian mechanics is tested at each stage. — £20 (d)

SCIENCE TOPICS: ECOLOGY
This program allows students to take the part of groups who manage a nature reserve according to their own special interests. The object is to keep all groups satisfied. — EC £20 (d)

SCIENCE TOPICS: POLYMERS
Students run a manufacturing company and must make decisions as to the best materials to use for their products. They compete with a computer run rival company. Two areas of manufacturing are featured — car parts and kitchen equipment. — EC £20 (d)

SECONDARY SCIENCE: MICROTECHNOLOGY
This software for the 14-16 age group will help students understand certain fundamental concepts in basic electronics. The pack contains Logic and Resistor Tutors, a Servo circuit simulation and a Circuit Design program. — £7

SECONDARY SCIENCE: THE MOLE CONCEPT
A computer synchronised audio program which explains definitions of atomic and molecular masses and attractively depicts molar equations. The audio track is written and presented by Fred Harris. — EC £17 (c); EC £13 (d)

SECONDARY SCIENCE: UNIFORMLY ACCELERATED MOTION
A physics program which illustrates basic equations, uniform acceleration under gravity and the idea of terminal velocity. The medium is computer synchronised audio. — EC £17 (c); EC £13 (d)

VU-TYPE
The popular 'sight and sound' touch-typing tutor using colour graphics. The layout and parameters can be altered. 23 exercises can be loaded from disc. — EC £16 (d)

GENERAL

GAME CORE
This software gives you all the information and intelligence routines you need to write simple and highly absorbing board games for your computer. — £9 (d)

MONITOR
A professional tool for mahcine-code programmers, suitable for assembly language experts and beginners alike. It is also ideal for teaching assembly language. — EC £34 (d)

TOOLBOX 2
25 programming aids for the BBC Model B. Book (essential) sold separately. Program include machine code monitor, disassembler, fast flood fill, sprite generator/mover, and many more. — £9 (d)

ULTRACALC 2
An electronic spreadsheet program with all the necessary built-in features. Ideal for business and personal management. — £52 (d)

VU-TYPE PROFESSIONAL
An enhanced and expanded version of Vu-Type including many 63 Pitman-approved exercises. — £19 (d)

WORD MOVER
A simple text editor offering the basic facilities of a fully fledged word processor, especially suitable for network environments where ROMs are impractical. Includes a terminal emulator. — EC £9 (d)

WHITE KNIGHT Mk 12 £16 (d); **BATTLEFIELDS** £8.50 (d)
DEUTSCH DIREKT £17 (d); **A VOUS LA FRANCE** £17 (d)

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LETTERS

Write to Letters, Acorn User, 141-143 Drury Lane, London WC2B 5TF

A WASTE OF MONEY?

Sir, After three months of using my BBC B+ 128k I am determined to sell it. This is because the extra money I paid for it and the extra memory that came with it has gone totally to waste.

I recently read your article in the letters section on compatibility. Instead of complaining about what is compatible and what is not, why do people not make separate software for each machine and take advantage of the extra memory in the B+?

I decided to phone up a few software houses and put the idea forward to them. Everyone I phoned gave me a different excuse as to why they couldn't do such a thing. So finally I phoned Acornsoft.

Acornsoft said: 'We do not and will not make software for the B+ because the B+ was only initiated to help Acorn out of severe financial pressure and is now obsolete.'

So it seems first time buyers and other people were duped into buying the B+ thinking they could get better software and use a more flexible computer than the B. How wrong I was.

If I had saved £200 I could have got a 32k BBC and be no worse off than I am now.

L Cool
London

PLEA FOR PLAIN TALK

Sir, I have just received May's copy of *Acorn User*, and I have noted a letter from Mr Brian Bowell ('Speak plainly to me').

May I, through your pages, back up Mr Bowell's plea for an increase in plain English and a reduction in the amount of jargon used in your articles?

My knowledge of computers is limited due to the amount of time available to 'play' with them, and so I tend to fall behind. Life for me would be easier if your excellent publication were to use easier phrases.

Clive Edwards
Sheffield

LICENCE PRICE TOO HIGH

Sir, As the manager of a rapidly growing Econet system, I have been looking forward to site licences becoming available for Acorn's ROM software. As a writer of software myself, I reckon that it is fair to ask for up to one and a half to two times the single user rate, to allow use over a network.

I was prepared to budget, next year, for licences to cover *View*, *ViewSheet*, *ViewStore* and the graphics extension ROM. And I was also considering using either Comal or ISO-Pascal as alternative languages.

It was with some disgust that I read of the prices to be charged, in this month's *Acorn User* magazine. There is no possible way I could justify the expenditure of something approaching £2000 on this software. I will therefore plan to continue to use the software which is readily available in the education sphere, and for which I need to pay no further charge.

Acorn has only survived because of its links with education. I would urge Acorn to reconsider its pricing policy. I sincerely believe that it will make more profit by asking less. I also regret that secondary school pupils will be unable to get the flavour of interesting software packages purely because of Acorn's mistaken policy of pricing itself out of the market.

Leslie J Want
Derby

PROBLEMS WITH PAGE

Sir, I welcome your review of *Pagemaker* and *Fleet St. Editor* – more balanced and realistic than others I've read.

As a user of *Pagemaker* for the past few months I've certainly been impressed by the individual features but rather disappointed in that it does not really do very well what it was bought for, namely, to produce a school newspaper. The main drawbacks are, as you point out, the typeface and page size.

However, my main grumble about *Pagemaker* is that it is not Econet-compatible. To use the software, I've lost a machine from the network by having to remove the network controller chip.

Unless AMS comes up with an Econet-compatible version it will be back to cut and paste using text columns printed from *View*.

Desmond Hamilton
Perthshire

If you have DNFS or network chips in the Econet machine, they detect the Econet interface and alter PAGE, so *Pagemaker* won't run. It should be possible to turn the NFS off (although we haven't checked these three methods yet):

1. If you have DNFS, type in ?&224=&A6 before you do anything.

2. If you have DNFS in socket 15, turn off NFS part by ?&DFF=?&DFF+128.

3. With ANFS in say, socket 15, type ?&DFF=255.

Try these before loading *Pagemaker*. All the methods survive CTRL-Break, so you'll have to turn the machine off to re-activate the net chip.

We used *Pagemaker* on a Master on the net, and this worked perfectly as the Master does not access any user memory for disc or net.

IN SEARCH OF PASCAL

Sir, I am writing to complain about the lack of Pascal articles and programs in your magazine. I find it very surprising since Acorn implements an excellent version of ISO Pascal and it is widely used. Recently I put an ad in your magazine asking for Pascal users since I am in the process of forming my own user group and the number of replies was MEGA!

The problem is that unlike BBC Basic where there are hundreds of utility programs available there are no Pascal utilities. Therefore we need to have these programs printed and also articles so that we can get some use out of the two ROMs we've purchased. So come on! Let's have some indent, link and variable lister programs.

By the way, for anyone interested in a Pascal User Group write to BLEEP, c/o C J McIntosh, 3 Foyle Road, Blackheath, London SE3 7RQ.

C J McIntosh
London

We agree with everything you say, but receive very few utilities or programs for languages other than Basic. That's why we carried a language forum in June's issue to encourage people like yourself to exchange ideas.

TROUBLE AT THE CIRCUS

Sir, I brought the *Circus* game for the BBC B from the Mysterious Adventure series. After three weeks I still cannot get passed the first page. I have tried everything and am now at breaking point. Do any readers have hints or instructions?

Michael Lloyd
Hampshire

LETTERS

TYPING AND TALKING

Sir, In common with other reviewers of the Namal *Type & Talk*, Martin Phillips has remained so long in contemplation of DIP switch settings that he has failed to consider the significance of its pronunciation characteristics. For instance, the fact that when the word 'wind' is entered, 'wind' but never 'waind' is output. Lacking perception of that which he cannot conceive, he concludes that it is a 'simple' device, which fails to 'tame' the English language. This, he concludes, implies a lack of that essential quality needed for use with infants.

The Namal consists of two sophisticated ICs. The first models the human vocal tract and takes as its input phoneme codes similar to the International Phonetic Alphabet. These are converted to speech like sounds according to their phonetic context.

The second chip takes ASCII encoded text as input and then outputs the phoneme codes required by the first one.

The phonemes are derived from the text using rules based on our knowledge of the relationship between written and spoken language. Thus, we have an expert system which converts written language into a form we can hear, and which sounds very close to human speech.

It is, of course, *not* speech for it conforms to the conventions of writing and lacks the intonational information in speech. To differentiate this form of acoustic language from synthetic speech, I had the temerity to coin the neologism *audiotext*.

Because audiotext is writing-made-audible, listening to it is an ideal pre-reading exercise; with the bonus that the words always sound exactly the same. (Unless, of course, you can't spell!).

Learning to listen to audiotext is extremely easy: we already can listen to speech. But audiotext reaches well beyond language. It knows about numerals, operators, logograms: all the systems of notation that children spend some 40 per cent of their schooldays learning. So it can say sums as well as sentences.

The Namal *Type & Talk* provides another text output stream: for ears, not eyes. It can be used successfully in all types of educational software, where it improves child-computer interaction out of all recognition. It is also, of itself, a major language resource.

No computer without this type of facility can rightfully claim to be an educational computer.

MP Doyle
Ravenscliffe Centre
Bradford

Martin Phillips replies: I appreciate that the Namal *Type & Talk* is technically quite advanced, but let's not get carried away with technology for technology's sake.

Mr Doyle claims that it sounds very close to human speech. Close perhaps, but nevertheless not speech – one has to strain very hard to understand what is being said.

The claim that it can be used successfully with all types of educational software is ambiguous. Yes it probably can be made to work with all types of educational software, but I can think of few programs where its use would enhance the educational aspects of the program. Similarly I would question the wild statements: 'improves child-com-puter interaction out of all recognition', and 'no computer without this type of facility can rightfully claim to be an educational computer'.

The poor quality of speech rules out many applications. But as I pointed out in the review, there may well be some special applications where such a device could prove to be very useful.

PRINTER PURCHASE

Sir, I have recently become involved in producing a local newsletter. I am considering buying a software package for the BBC model B to help with the layout of the newsletter.

I also require a printer that will produce a hard copy of sufficient quality to be used as a master copy. I am baffled by the range, cost and specifications of the printers available.

An electronic typewriter interfaced to the BBC B (if possible) may be a better buy as it could be used as a portable, though it might not be software compatible.

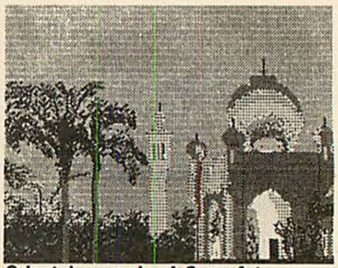
Your advice and comments in this matter would be much appreciated.

F D Wykes
Milton Keynes

Pick your software and then find out which printers it is compatible with. That should narrow the choice down. Then it's usually a matter of facilities and speed versus price. If you want to dump ordinary graphics, make sure you can get a 'screen dump' program for the printer. If you do go for a portable, software compatibility could be a big problem. See the December 1985 issue for a printer round-up.

ART ON THE SMALL SCREEN

Sir, Chris Parker seems to have misunderstood my comments regarding the loading in of screens. He is quite right to say that *AMX Art* screens (originally in Mode 4) can be loaded into *Super Art*. However my comments concerned the problem of loading existing mode 1 screens into Super *Art*. Following my comments in June's *Acorn User* about AMX *Super Art* I am pleased to say that



Oriental example of *SuperArt*

Elliott software has very kindly supplied an answer to the problem which I now pass on.

To convert an existing mode 1 screen for use in *Super Art* you simply load in your screen (named SCREEN in this example) and then resave it with a few amendments like so:

```
10 MODE 1
20 *LOAD "SCREEN"
30 *SAVE "SCREEN1" 3000 +5000 2820 20F
```

The last set of figures refers to the colours used in your original screen and may vary. You may now use SCREEN1 in *Super Art*.

Jonathan Inglis
London

SECOND RATE SOFTWARE?

Sir, I have now had my Electron for over a year, and I must say how disappointed I am with it. I am very disappointed with the amount and the quality of the software on the Electron. Take *Elite* for instance. It is not half as good as the BBC version. Also I am disappointed with other games which have been cut down on the Electron. I don't see why Electron games should not be as good as BBC games because they both have the same memory.

J Harris
Preston

Although the Electron has the same memory, it works slower than the BBC and doesn't have some of the chips which help programmers improve BBC games. Remember, you paid less than half the cost of a BBC.

DANGERS OF MAIL ORDER

Sir, Dr Harper's letter (*Acorn User* – May) opens a window on the mail order problem which had rather escaped me. Given that publicity is a snare and a delusion, to provide a coupon when there is no stock is little short of a downright swindle.

Telephoning around can be an unprofitable business too – especially from outside the UK. Writing can be equally fruitless. One can feel lucky to get a few scrawled words in reply on the bottom of one's returned letter. I suspect that even quite well-known companies' mail order departments consist of a solitary bod to open letters and bank the cheques.

But in a world of violence and wheel-clamps, keeping the money without responding is probably considered an innocent hoodwinking activity. But why should we subsidise the cowboys?

An average 60 per cent advertising content in the press demonstrates what a lucrative business it is. Unfortunately the customer pays the bill for what is frequently an optical illusion, both in performance and fact.

The iniquity is that the public have been indoctrinated and is now fair game, with or without a Consumers Association. So what choice do we have? Anywhere south of the Pyrenees a BBC computer is as rare as a £3 note. Buy an air ticket and get off to London to sort them out in the shop? An expensive remedy!

Having given mail order a well earned broadside, let me say that salvation is usually at hand from the magazine, which has a sense of fair play, no reluctance to dispense the written word and a genuine wish to keep the readers happy and the advertisers in line. They also do a very good job. I've had the BBC micro over 12 months trying to do calculus and other useless things before I discovered *Acorn User*, which has opened up many of the possibilities and stimulated me into doing things I would never have thought of on my own.

Maurice Gordon
Portugal

A DEALER REPLIES

Sir, With reference to Dr Harper's letter in the May issue, I think it only fair to put forward the dealer's point of view. His letter was probably prompted through difficulty in obtaining 80 track disc drives at the advertised prices in the March issue.

It must be pointed out that there has been a shortage of disc drive products within the UK. Also, recent gains in strength against sterling by major foreign currencies plus the lack of product in any significant volume has resulted in some unfortunate price increases. All this has not been helped by a basic price increase from Mitsubishi.

These new prices on disc drives are therefore real, unexpected price rises passed on to the dealers and therefore to customers. They certainly cannot be described as 'fantasy prices'.

I would like to make clear what happened with the Tiger Software advertised drive prices in the March issue of *Acorn User:*

1. The March issue was published around the middle of February.
2. Advertising copy deadlines for that issue were around the middle of January.
3. At that time of copy deadline, all (Cumana) disc drives were available from Tiger Software *and* at the published prices.
4. By the time the March issue was published, considerable public demand for 80 track drives, for both single and dual versions had almost exhausted stocks.
5. New stocks of 80 track drives were then very difficult to obtain. New supplies eventually obtained were at a higher price. Cumana for one, had no alternative but to increase prices from February 1. They also managed to absorb further rising costs to themselves – until April 21 when additional price increases came into force and had to be passed on to customers.
6. Cumana was not alone in having to increase drive prices.

T Gilbert
Tiger Software
Dorset

THE SOUND OF SNOOKER

Sir, I am writing about the Steve Davis 'Snooker' game which I bought a while ago for the Master 128. It works on this machine and includes sound. This I found out by accidently pressing the wrong keys. To get sound, press the CTRL + S keys.

J U Hulme
Peterborough

Latest round-up of games high scores

Aviator	Acornsoft	30,450	**P Hopgood***
Android Attack	Computer Concepts	1,495,105	**Tim Hedger***
Arcadians	Acornsoft	98,020	**Niaz Islam***
Battletank	Superior	108,500	**Stephen Corcoran***
Castle Quest	Superior	2,240	**Peter Simpson***
Chukkie Egg	A&F	30,275,420	**Stephen Corcoran***
Crazy Painter	Acornsoft	279,790	**Richard Arundale***
Cybertron Mission	Micro Power	715,960	**Niaz Islam***
Fortress	Pace	129,250	**Stephen Corcoran***
Frak!	Aardvark	20,000,200	**Paul O'Malley***
Free Fall	Acornsoft	5,024	**Philip Comber***
Hopper	Acornsoft	52,422	**John Durrans***
JCB Digger	Acornsoft	131,450	**Stephen Corcoran***
Killer Gorilla	Micro Power	836,475	**Stephen Corcoran***
Match Day	Ocean	10-0	**Matthew Pedeaux**
Meteors	Acornsoft	498,500	**P Ludgate***
Missile Control	Gemini	469,225	**Ian Boffin***
Monsters	Acornsoft	283,000	**Stephen Corcoran***
Mr Ee	Micro Power	944,350	**Stewart Roberts**
Moonraider	Micro Power	642,125	**Stephen Corcoran***
Overdrive (BBC)	Superior	338,450	**David Perry***
Overdrive (Electron)	Superior	1,011,720	**P Ludgate***
Painter	A&F	203,690	**Nigel Shaw***
Pengo	Watford	300,400	**Stewart Roberts**
Planetoids	Acornsoft	3,186,450	**Stephen Corcoran***
Pole Position	Atari	384,250	**Niaz Islam***
Rocket Raid	Acornsoft	161,460	**Roger Austin***
Snapper (BBC)	Acornsoft	1,839,210	**Peter Simpson***
Space Adventure	Virgin	4,890	**Mark Bradshaw***
Starship Command	Acornsoft	8,420	**Ian Boffin***
Zalaga	Aardvark	23,460,500	**Ian Boffin***

**Scores unbeaten since February 1986*

Please say whether your score was notched up on a BBC micro or Electron when sending in your games high scores as in future issues we'll be publishing separate tables for each micro.

WORKING ON THE ELK

Sir, I've converted some of your programs to run on the Electron, for my daughter. However, my feeling is that if you don't encourage Elk owners to use *AU* programs, by making them accessible, you won't get feedback, because they'll drift back to the comics. It's a vicious circle. But I must compliment *AU* on doing much to remove the ambiguity which is a feature of so many articles and adverts about Acorn machines – it's usually clear whether we're included, though I'd still like to see page headings making sure we know before we begin, as with your program listings. *Hints and Tips* I particularly enjoy, especially the one liners, like how to ensure you get a capital letter input.

Bernard Emblem
Bury

REPAIR CORRECTION

Sir, I note that under the heading of 'Scottish Repairs', *Acorn User* suggests that Micro-Serv is the first Scottish repair centre for Acorn products. This, however, is quite incorrect.

I was one of the first engineers to set up an approved service centre in Scotland, in 1982, and have been running ASCs continuously since then. There are, and have been, several other ASCs in Scotland in the last few years.

In actual fact, my company (Microbank Limited) is one of the principal repair centres for BBC Micros and other Acorn products (as well as a range of peripherals from other manufacturers). It is one of the few centres authorised for the complete range including BBC computers, all Acorn peripherals, Acorn Scientific products, Econet products, and Masters. We are the repair centre recommended by Acorn Customer Services for Scottish customers, in the same way that RCS and Star-Help are recommended for customers south of the border. We, too, accept repairs by post, and carry out dealers' repairs.

Peter Turnbull
Microbank Ltd
PO Box 22, Livingston

GREEDY ROMS

Sir, I have been an avid supporter of the BBC Micro more or less from its launch. I now have an Acorn 1770 interface with DFS (version 2.26) with the Acorn ADFS ROM (version 1.30).

I do, however, have a serious complaint about the private workspace required by the ADFS. With both of these ROMs fitted, the default value of PAGE is &1F00 (compare this with the default value of &1900 with the normal DFS fitted) which cannot be lowered by redefining the value of PAGE. As there is an increasing number of users who have access to sideways RAM, would it not be possible to use this RAM to hold the disc filing systems workspace, thus allowing the value of PAGE to be lowered to &E00? Such a system is in use in the Master series.

In terms of compatiblility, the Acorn 1770 DFS I had fitted is completely compatible with 'legally' written software, even those software items which are disc-protected by the 8271 FDC OSWORD calls, eg *Elite*, will run with no problems.

Another point which may be helpful to readers hoping to upgrade to the ADFS is to bear in mind that certain programs on the utilities disc supplied by Acorn need Basic II or later versions in order to run – one such problem here is the INPUT text; statement in Basic II.

Clive Brown
London

The ADFS does indeed use up a lot of memory. As you say, this problem is avoided on the Master by use of Sideways RAM, although we do not think this can be done on a model B (though readers usually prove us wrong on these things).

As for the Basic II problem, Acorn's programmes seem to have forgotten that almost half-a-million BBCs were sold with Basic 1, and simulating most Basic 2 commands is very easy. Someone at Acorn needs their head testing for introducing such problems.

WORDWISE WORKSPACE

Sir, I have the *Wordwise Plus* wordprocessor ROM fitted to my BBC B, and I have always had problems with it refusing to spring to life after running certain commercial software. The *Wordwise Plus* prompt appears and the machine crashes displaying an immovable cursor! I have since, found that this is common and the only way to clear it seemed to be to turn the machine off and then on again, always a bad habit and likely to reduce the life of any electrical gadget.

Upon poking around in the *User Guide* I found reference to the paged ROM private workspace table from &DF0 to &DFF. Each of the sixteen possible ROM locations has a one byte entry containing the upper byte of the location of its private workspace and as my *Wordwise Plus* ROM occupied ROM position fourteen, its entry was in &DFE. I checked this value upon switch on and found it to be 57 but after running the guilty software it was switched to zero. Although other ROMs appeared to reinitialise their own values after a hard break *Wordwise Plus* does not seem to, and thus, failing to find its way to its private work area, it hangs miserably until rescued by switch off! Now all can be restored by entering ?&DFE=57 and the power supply is spared yet another trauma.

Larry Richardson
Norfolk

Computer Concepts replies: The problem is part of our protection system, but newer versions do not have the problem. The value of 57 will work in this case but will *not* work in others as it changes from machine to machine. The reason we did it in this way was to prevent any published value working on other machines.

OBSOLETE PRINTERS

Sir, Owners of obsolete printers like the Riteman or NEC 8083, including owners of printers which don't appear to work properly with *Pagemaker*, should contact John Simpson of AMS (address envelope: *Pagemaker* Printer Compatibility). Owners should include a copy of the relevant printer codes and as much other information about their printer as possible. AMS will endeavour to supply a suitable *Pagemaker* dump routine which each owner should test, reporting any problems back to AMS.

AMS are keen to contact any *Pagemaker* users who experience DFS, ROM/RAM expansion board or ROM clashes with the *Pagemaker* system. If non-standard DFS users have problems initialising discs it is due to their DFS not fully emulating the 8271 disc controller. Both the Watford DFS (1.4 and greater), and the latest Opus DDOS are compatible with *Pagemaker*. The Ramamp RA32 ROM/RAM board is not compatible with *Pagemaker* but they have a 'patch' available to allow *Pagemaker* ROMs to work. *Pagemaker* is fully compatible with the popular ATPL sidewise expansion board.

Chris Drage
London

READER SURVEY

Here's your chance to say how you would like to see *Acorn User* develop in the next year – and win some hardware into the bargain. What we want is for you to help us give you a better magazine. The survey answers you give will be compiled statistically and your individual questionnaires will be kept confidential.

Remember, all your replies go towards helping us give you the magazine *you* want – Reader Services, for example, is a direct result of last year's survey.

We want our readers of all ages, sexes and opinions to tell us what they think. If younger readers have any problems filling in the questionnaire, ask a friend, teacher or one of your family to help.

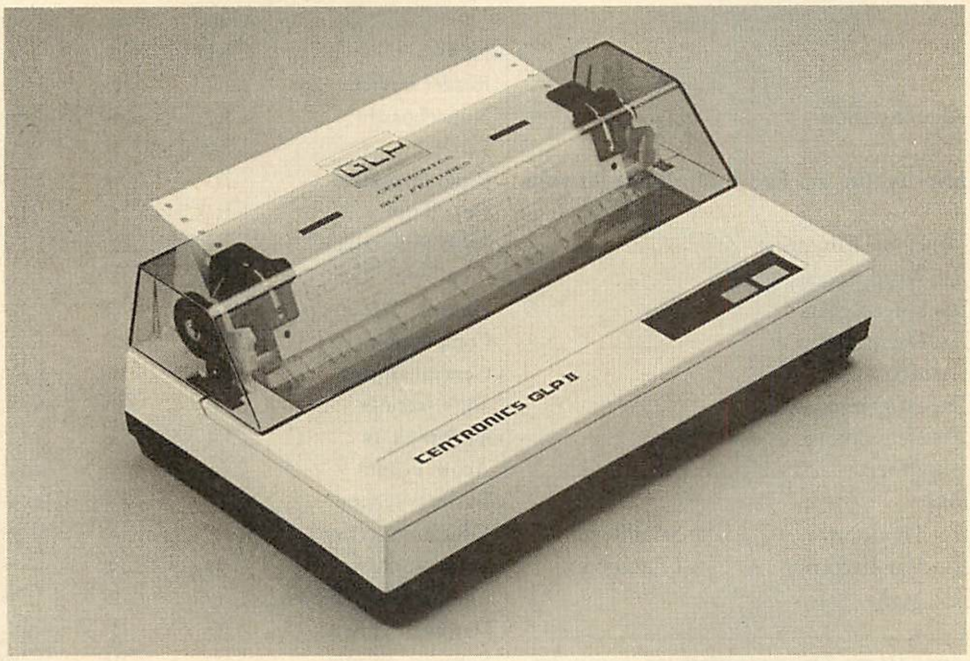
Just tick the box or boxes you think are relevant and be as honest as possible. If you want to make extra comments, feel free to do so on a separate sheet of paper. If you don't want to tear up your copy of the magazine, just send us a photocopy of the survey pages. Fill in your name and address, and give us your slogan idea to enter the prize competition. The writers of the three best slogans will win a Centronics Great Little Printer (the editor's decision is final!). Winners will be notified by post and their names printed in *Acorn User*. All forms must be in by Friday July 18. Send them to *Acorn User* Survey, 141-143 Drury Lane, London WC2B 5TF.

Name ____________________

Address ____________________

____

____



To add a little spice to life and encourage you to fill in and send off your questionnaire we're giving you the chance to win a Centronics Great Little Printer for filling in our little slogan at the end. There are three GLPs on offer for the best slogans.

The GLP II is one of the neatest dot matrix printers you've ever seen, and yet comes with an impressive list of features, including:

- Near letter quality print (NLQ) at the touch of a button
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- Graphics capability
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- Centronics parallel and RS232 serial interfaces fitted as standard

The Centronics GLP II has a retail price of £199.95 (plus VAT).

YOUR COMPUTER SYSTEM

1 Which micro(s) do you have?

☐01 BBC micro model A ☐05 Atom
☐02 BBC micro model B ☐06 Electron
☐03 BBC micro model B+ ☐07 Master
☐04 BBC micro B+ 128k

2 Has anything ever gone wrong with your micro?

Yes ☐01 No ☐02

3 Which of the following do you have?

Basic 1	☐01	OS 0.1	☐04	DNFS	☐07
Basic 2	☐02	OS 1.0	☐05	ADFS	☐08
DFS	☐03	OS 1.2	☐06	Don't know	☐09

4 What peripherals do you own or hope to buy?

	Own	Hope to buy
Monitor	☐01	☐10
Disc drive	☐02	☐11
Printer	☐03	☐12
Joystick/lightpen	☐04	☐13
Mouse	☐05	☐14
RAM or ROM board	☐06	☐15
Second processor	☐07	☐16
Modem	☐08	☐17
Other	☐09	☐18

5 Where do you buy your hardware and software?

	Hardware	Software
High Street store	☐01	☐05
Mail order	☐02	☐06
Acorn dealer	☐03	☐07
Other	☐04	☐08

6 How much did your hardware system cost to buy?

£201-£400 ☐01 £401-£1000 ☐02 £1001-£2000 ☐03 £2000+ ☐04

READER SURVEY

7 How many software packages do you have?
0-5 ☐01 6-10 ☐02 11-20 ☐03 21+ ☐04

8 Estimate your software expenditure in the past 12 months:
0-£20 ☐01 £21-£50 ☐02 £51-£100 ☐03 £101-£500 ☐04 £501+ ☐05

in the next 12 months:
0-£20 ☐06 £21-£50 ☐07 £51-£100 ☐08 £101-£500 ☐09 £501+ ☐10

USER PROFILE

9 Are you: ☐01 male? ☐02 female?

10 How old are you?
15 or younger ☐01 15-24 ☐02 25-34 ☐03 35-44 ☐04
45-54 ☐05 ☐ 55+ ☐06

11 What do you mostly use your micro for? (tick one box)
☐01 Recreation/hobby
☐02 Education
☐03 Business
☐04 Home/club/personal administration
☐05 Other ____________

12 Number, in order of priority, the top five applications for your micro:
☐01 Teaching ☐09 Home Education
☐02 Industrial ☐10 Wordprocessing
☐03 Scientific ☐11 Spreadsheets
☐04 Games ☐12 Database
☐05 Adventures ☐13 Accounts
☐06 Graphics ☐14 Programming
☐07 Communications ☐15 Networking
☐08 Languages ☐16 Other ____________

13 What is your occupation?
☐01 Finance ☐04 Transport ☐07 Sales/Retail
☐02 Government ☐05 Manufacturing ☐08 Education
☐03 Unemployed ☐06 Media
☐09 Other ____________

14 Do you authorise expenditure on computers or computer-related products at work?
Yes ☐01 No ☐02

15 Would you like to upgrade your computer?
☐01 To a Master ☐02 To another micro ☐03 No

16 Do you belong to or use any of these?
☐01 Computer club ☐03 Micronet/Viewfax/Prestel
☐02 Electronic mail ☐04 Bulletin board

17 Do you program in any of these languages?
☐01 Basic ☐05 Z80 assembler
☐02 MicroProlog ☐06 6502 assembler
☐03 BCPL ☐07 Pascal
☐04 Forth ☐08 Logo
☐09 Other ____________

ACORN USER

18 Do you:
☐01 Subscribe to *Acorn User?*
☐02 Have a newsagent order?
☐03 Buy *Acorn User* regularly?
☐04 Read someone else's copy?

19 How long have you read/bought *Acorn User?*
☐01 0-3 months ☐02 4-6 months ☐03 7-12 months ☐04 13 months +
☐05 From the first issue

20 How many other people read your copy? ____________

21 Do you read any of the following regularly?
☐01 *Acorn User* ☐05 *Electron User*
☐02 *A&B Computing* ☐06 *The Micro User*
☐03 *Beebug* ☐07 *Personal Computer World*
☐04 *Practical Computing* or *Micro Decision?*

22 Do you read the advertising in *Acorn User?*
☐01 None ☐02 Some ☐03 Most

23 Have you bought mail order products from advertising in *Acorn User?*
☐01 Yes ☐02 No

24 From which of these would you order products by mail?
☐01 Any advertiser in *Acorn User*
☐02 Only advertisers you see regularly in *Acorn User*
☐03 Only one of the well-known industry names?

25 Rate the following features:

	Good	Fair	Poor
News	☐01	☐02	☐03
Reader service	☐04	☐05	☐06
Noticeboard	☐07	☐08	☐09
Letters	☐10	☐11	☐12
Program update	☐13	☐14	☐15
Dear Kitty	☐16	☐17	☐18
High score tables	☐19	☐20	☐21
First Byte	☐22	☐23	☐24
Hints & Tips	☐25	☐26	☐27
Competition	☐28	☐29	☐30
General articles	☐31	☐32	☐33
Joe's Jottings	☐34	☐35	☐36
Yellow pages	☐37	☐38	☐39
Acorn Forum	☐40	☐41	☐42
Business section	☐43	☐44	☐45
Education section	☐46	☐47	☐48
Software charts	☐49	☐50	☐51
Comparative reviews	☐52	☐53	☐54
Hardware reviews	☐55	☐56	☐57
Software reviews	☐58	☐59	☐60
Free ads	☐61	☐62	☐63
Diary	☐64	☐65	☐66

26 Name the three best articles/progams you have read in *Acorn User*.
____________ month ______ year ______
____________ month ______ year ______
____________ month ______ year ______

27 How many listings do you type in each month?
☐01 None ☐02 Some ☐03 Most ☐04 All

28 Number your top three preferences for expanding *Acorn User* services:
☐01 Listings on Micronet
☐02 An *Acorn User* bulletin board
☐03 Phone enquiry service manned at weekends
☐04 Talks in local halls by *Acorn User* authors
☐05 Weekend courses organised by *Acorn User*
☐06 More *Acorn User* software
suggestion ____________
☐07 More reader offers
suggestion ____________

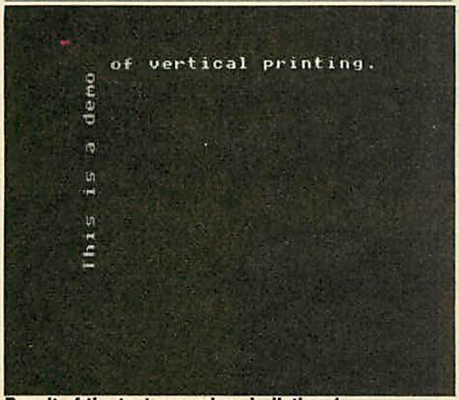
Finally, to qualify for the prize draw, think up an idea to improve *Acorn User* in less than 15 words

____
____
____

HINTS & TIPS

Martin Phillips' offerings include a look at undocumented OS calls, help on configuring the Master, a program to produce polar graphics and a vertical print routine

£10
PRINTING IN A SPIN



Result of the test procedure in listing 1

J A Law from New Zealand wins himself £10 for sending in a routine to rotate and print text vertically which could be useful, say, for labelling graphs. It will work in any mode except mode 7 and after assembling the code the method of use is:

PRINT TAB (X,Y); (to position cursor)
*LINE . . . .

Note that it is important to put the semicolon after the brackets. The program (listing 1 on the yellow pages) makes use of the *LINE command. Before this command can be used, the user vector at &200 must be changed to point to the start of the code, which has been done at the end of the procedure to assemble the code. The code has been assembled at &900. This can be changed, but care must be taken to make sure the uservec still points to the new location. If it is coded in the manner given in listing 1, it is only necessary to change line 230. A checksum is also included – if a checksum error is given, do check your listing carefully. The REM statements (the parts following the slash) can be missed out without affecting the checksum, as can spaces. This checksum is only provided to make sure the code is entered correctly; it plays no part in the actual routine. A test procedure is given to show how the routine is used.

The program prints the text turned through 90 degrees anti-clockwise. It can be adapted to print the opposite way, ie, through 90 degrees clockwise by changing the following lines:

540 LDA &80,Y:ROR A
560 LDA &88,X:ROR A
800 LDA #10:JSR wrch

ROL shifts each bit one place to the left, ROR shifts each bit one place to the right, and this reverses the letter. Next the text has to move down the screen instead of up so ASCII code 10 is used to move the cursor down one space instead of ASCII code 11 which moves the cursor up one space.

TO NAME A DISC

When I first got a disc drive I used to catalogue each disc and use the disc title facility to give each a title. When the novelty wore off I never bothered and since then I've never used the

```
   10 REM Hints & Tips - list
ing 2
   20 REM Read disc title
   30 REM by Martin Phillips
   40 REM for BBC B/B+/M/E wi
th discs
   50 REM (c) Acorn User July
 1986
   60 :
   70 PRINT FNtitle
   80 END
   90 :
  100 DEF FNtitle
  110 !&71=&70:A%=5
  120 X%=&70:Y%=0
  130 CALL &FFD1
  140 t$=""
  150 FOR n=1 TO 12
  160 t$=t$+CHR$(n?&70)
  170 NEXT n
  180 =t$
```

Listing 2. Allows a disc title to be read from a program

disc title – that is, until recently.

I wanted a way to identify easily any one of three discs which could be swapped round, so that when a screen instruction asked for the disc to be changed, the program could actually tell that the disc had been changed. This was made more difficult because two of the discs could have the same catalogue entries. This could be a problem with a database program where one disc contains the program itself, and another disc contains the data.

I hit upon the idea of using the disc title. It's easy enough to title a disc from a program, simply by using the *TITLE command, though reading the title is not quite so easy.

The OSGBPB call with A=5 will read the title of the currently selected drive, and as it's a documented call it works on the BBC B, the B+, the Master and the Electron with disc interface.

A demonstration program showing how the title can be read is given in listing 2. The disc title is stored in a parameter block starting at location &71. Location &70 stores the length of the disc title – this is rather a waste of time, though, as the DFS always returns 12 (the maximum permitted length for a title) no matter how long the title actually is.

The program can test for a specific title on a disc. The following syntax should be used, to test for a data disc with the title 'data':

IF INSTR(FNtitle,"data")>0 THEN . . .

This syntax allows for there being a number of spaces at the end of the title. Using the example of a database, to test for the system disc with a title 'system', use the line:

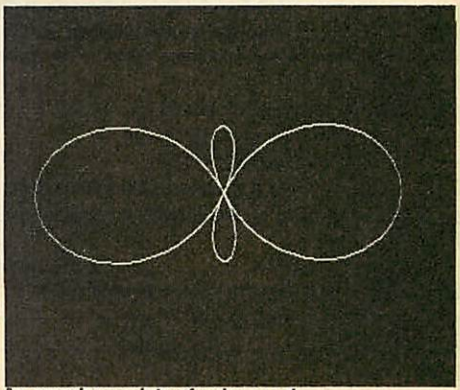
IF INSTR(FNtitle, "system")>0 THEN . . .

It's possible to have both the system and the data on one disc by using the disc title 'system data'. To put this title onto the disc, complete with the space (which is not really necessary), the title must be enclosed in speech marks:

*TITLE "system data"

The routine will now accept the disc as either a system or a data disc. This technique can prevent all sorts of problems when using programs which need discs to be changed.

POLAR GRAPHICS



An amazing variety of polar graphs . . .

Listing 3 on page 53 gives a short program to produce an amazing variety of polar graphs. Polar co-ordinates are a different way of locating points on a surface. Positions are measured from the pole by the angle and the

distance from the pole as shown in figure 1. It looks difficult but is really quite easy.

In listing 3, the angle is contained in the variable z, which loops from 0 to 2π (line 450) and the distance (or radius) is contained in the variable r. This is set according to the equation

```
   10 REM Hints & Tips - listin
g 3
   20 REM Polar graphics
   30 REM by Martin Phillips
   40 REM for BBC B/B+/M/E
   50 REM (c) Acorn User July 1
986
   60 :
   70 MODE 0
   80 VDU 19,0,4,0,0,0
   90 REPEAT
  100 PROCinput
  110 PROCinitialise
  120 PROCplot
  130 PRINT"Press a key ";
  140 A$=GET$
  150 UNTIL A$="E"
  160 END
  170 :
  180 DEF PROCinitialise
  190 step=0.02
  200 IF a>15 OR b>15 THEN step
=0.002
  210 m=0.1E-30
  220 FOR z=0 TO 2*PI STEP 0.1
  230 r=ABS(FNequation)
  240 IF m<r THEN m=r+step
  250 NEXT z
  260 ENDPROC
  270  :
  280 DEF PROCinput
  290 CLS
  300 PRINTTAB(20,5)"1..R=1"
  310 PRINTTAB(20)"2..R=SIN(Z)"
  320 PRINTTAB(20)"3..R=SIN(5*Z
)"
  330 PRINTTAB(20)"4..R=1+2*COS
(Z)"
  340 PRINTTAB(20)"5..R=1+COS(Z
)"
  350 PRINTTAB(20)"6..R=1+SIN(2
*Z)"
  360 PRINTTAB(20)"7..R=1+2*COS
(2*Z)"
  370 INPUT''"Enter a number (1
-7)"n
  380 IF n<1 or n>7 THEN GOTO 3
70
  390 INPUT"A = "a
  400 INPUT"B = "b
  410 ENDPROC
  420 :
  430 DEF PROCplot
  440 CLS
  450 FOR z=0 TO 2*PI+step STEP
 step
  460 r=FNequation
  470 X%=640+512*COS(a*z)*r/m
  480 Y%=512+512*SIN(b*z)*r/m
  490 IF z=0 THEN MOVE X%,Y%
  500 DRAW X%,Y%
  510 NEXT z
  520 ENDPROC
  530 :
  540 DEF FNequation
  550 IF n=1 THEN =1
  560 IF n=2 THEN =SIN(z)
  570 IF n=3 THEN =SIN(5*z)
  580 IF n=4 THEN =2*COS(z)
  590 IF n=5 THEN =1+COS(z)
  600 IF n=6 THEN =1+SIN(2*z)
  610 =1+2*COS(2*z)
```

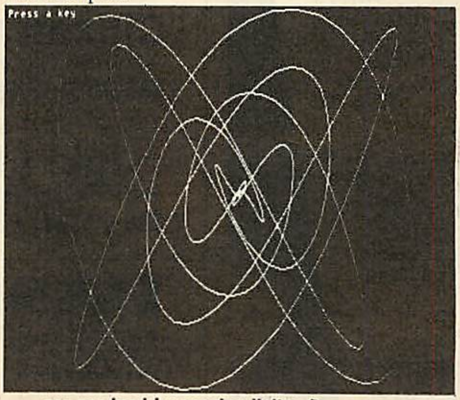
Listing 3. Gives a wide variety of polar graphs

chosen (line 460). In order to plot the graph of a polar function on the screen, it is necessary to convert the polar co-ordinates into conventional (x,y) or 'Cartesian' co-ordinates since these are used by Basic's MOVE, DRAW and PLOT commands. This is done using the trigonometrical functions sine and cosine (SIN and COS) in lines 470 and 480.

So that all graphs are scaled correctly, PROCinitialise is called before plotting. This procedure ensures that any graph plotted is the right size to fit comfortably on the screen.

The program has seven pre-defined equations and there are two variables (A and B) which can be entered and are best in the range of one to 10. Thus a wide variety of graphs can be produced.

Also it is possible to experiment with different equations: the equations will need to be changed in DEF FNequation and also in DEF PROCinput.



. . . are produed by running listing 3

THE MASTER CONFIGURED

I have had a Master for a month and I've twice had to reconfigure it. Both times I had managed to alter the configuration so that I could not even load from disc. I doubt I will be the first or the last to have this problem, so here is a way to reconfigure the Master from scratch (can anyone understand the control panel?). I also found the odd mistake in the manual, which didn't help.

The first step is to type *ROMS which will list all the ROM positions. On a standard machine they will be:

ROM F TERMINAL 01
ROM E VIEW 04
ROM D Acorn ADFS 50
ROM C BASIC 04
ROM B Edit 01
ROM A ViewSheet 02
ROM 9 DFS 02
ROM 8 ?
ROM 7 ?
ROM 6 ?
ROM 5 ?
ROM 4 ?
ROM 3 ?
ROM 2 ?
ROM 1 ?
ROM 0 ?

There might be differences in the version numbers, but the positions should be the same. If the word 'unplugged' follows any of the listed ROMs, then it will need to be switched on again. For example, if Basic is 'unplugged' you'll have to turn it on again by typing *INSERT &C.

The second step is to type *STATUS which displays the current status of the CMOS RAM. Here is an explanation of the configuration status, with the commands to change the status where required (some of the changes will not take effect until Break is pressed). The numbers in the angled brackets < > denote the possible parameter range.

Baud The serial baud rate both ways. A number in the range 1-8. This is equivalent to *FX7 and *FX8. Change using *CONFIGURE BAUD <1-8>. Default setting is 4 (1200baud).

Boot Here the *Welcome Guide* is incorrect. This changes the auto-boot option from Shift-Break to CTRL-Break, and Shift-Break then takes the function of CTRL-Break. Change using *CONFIGURE BOOT or *CONFIGURE NOBOOT

Caps This sets the start-up option for the Caps Lock key. There are three options:

- No Caps. On start up the Caps Lock key will be off.
- Caps. On start up the Caps Lock key will be on.
- Shift Caps. On start up the Caps Lock key will be on, and when the Caps Lock light is on, pressing the Shift key and a letter key will give a lower case letter (this is very useful when entering listings). Change using *CONFIGURE CAPS/NOCAPS/SHCAPS

Data Sets the data format for the serial port. Change using *CONFIGURE DATA <0-7>

Delay The auto-repeat delay. Default is 32. Change using *CONFIGURE DELAY <0-255>

Directory This is used with the ADFS. Change using *CONFIGURE DIR/NODIR

Tube This selects an internal/external co-processor. Normally set to internal. Change using *CONFIGURE NOTUBE/TUBE

Fdrive This sets the disc drive load/settle time and is therefore dependent on the disc drive being used. The range is 0-3. Newish drives

MOVIE MAKER



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With the **MOVIE MAKER** software package from Slippery Slug **ANY** user can create impressive animated films or graphics displays.

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Juki 5510
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£219.00 (190.43 + VAT)

Juki 6100
with BBC cable & paper
£285.00 (247.83 + VAT)

Juki 2200
with BBC cable & paper
£269.00 (233.91 + VAT)

TAXAN

with BBC cable & paper
£218.00 (189.57 + VAT)
(phone to check price)



KP810

	Ex VAT	Inc VAT
KP910 17" width printer	328.70	378.00
KP810 Paper roll	3.43	3.95
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LX-80 Printer Control/Dump Rom	13.00	14.95
LX-80 View Printer Driver 40/80T	8.65	9.95

Monitors

	Ex VAT	Inc VAT
Philips CF1114 TV/Monitor	173.04	199.00
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should work with a value of 0, otherwise start with a value of 3 and try loading from disc, reducing the value if loading is satisfactory. A value of 0 will halve the loading time compared to using a value of 3, so it is worth experimenting. Change using *CONFIGURE FDRIVE <0-3>

File The start-up filing system ROM number. In the above case, the number will be 9 for the DFS or &D for the ADFS. Change with *CONFIGURE FILE <ROM NUMBER>

Floppy Select hard (Winchester) or floppy disc using *CONFIGURE FLOPPY/HARD

Ignore Defines the character ignored by the printer (this is the same as the *FX6 call). The default is 10, to not give a line feed on printing. Set using *CONFIGURE IGNORE <0-255>

Lang The start-up language ROM number. This should either be Basic, or perhaps *View* or *ViewSheet*. Change using *CONFIGURE LANG <ROM>

Loud Sets the sound level. If set to quiet, no start-up bleeps are sounded. Change using *CONFIGURE LOUD/QUIET

Mode This sets the start-up mode (I prefer mode 7). Change using *CONFIGURE MODE <0-7,128-135>

PRINT Set the default printer in the same way as the *FX5 call.

0 printer sink
1 parallel printer
2 serial printer
3 user printer routine
4 network printer
5-255 User printer routine (but you are advised not to use them). Set using *CONFIGURE PRINT <255>

Repeat Sets the key auto-repeat (the default value is 8). Set using *CONFIGURE REPEAT <0-255>. If this and the delay is set to 1 it will be almost impossible to reset to the default value using *CONFIGURE! I can see some people having great fun with this, but seriously I believe this is a major flaw in the computer. One way to get out of this is to remove the battery, replace it and reconfigure the computer from scratch. A better way round it is to prepare a !BOOT file on a spare disc which can then reset the default values (this !BOOT file will need to be prepared in advance, of course). If you want to play around and see what I mean, program the function keys with the commands to restore the default values first. Some schoolteachers are going to love this feature!

Scroll See the manual for a description of this. Change using *CONFIGURE SCROLL/NOSCROLL

TV This is the *TV call, used to move the picture up or down a line on the screen. It should not be necessary to alter this if using a correctly-adjusted monitor. Change using *CONFIGURE TV

UNDOCUMENTED CALLS

Now and then you read about 'illegal' or 'undocumented operating system calls'. Both in books and magazines such calls are used without any mention that they are undocumented – but what does undocumented mean?

Most people take this to mean that no-one has written about it before, but, this is not what they are. An undocumented call is an FX call or an operating system call which according to the handbook does not exist, but which seems to work well. Who does the documentation then? The answer is Acorn. If it documents a command in the handbook you can assume it's safe to use. Any call not documented in this way can't be relied on to be safe, although many such calls then turn out to be standard.

Where do these undocumented calls originate from, then? Are they simply calls which Acorn has forgotten to document? Most come from authors writing about things such as the operating system or the disc filing system, or programmers keen to find some new elegant routines. They delve into these chips and disassemble them to find out what calls have been used. They then get written up in the author's book or as a magazine article, and are subsequently copied by many people.

At this point it becomes difficult to tell whether these calls are legal (ie, documented) or not. To add to the confusion, some of these undocumented calls work with no problems and eventually become accepted as documented calls. To give an example of one such call, I was recently trying to find a way of testing whether there was a write-protect sticker on a disc so that if there was I could remind the user to take it off before proceeding.

The simplest way to do this is to use the *OPT call to write to the disc and if it gives an error (error number &C9) you know there is a write-protect sticker on the disc. This method is rather crude, and generating error messages in this way can create more problems, so I looked for a better solution.

I found a possible routine in a book on disc drives, although the book did not appreciate its potential. I was really pleased with this routine (listing 4) as, apart from not having to generate error messages, it was faster. It tested the state of the drive, something the DFS does every time it writes to a disc. There was one drawback, though. It was an undocumented OSWORD call, and of course, it works fine on an ordinary BBC B, but try it on an Electron, a B+ or a Master, all of which have a different disc filing system, and it doesn't work. Oh well, back to the drawing board.

```
   10 REM Hints & Tips - lis
ting 4
   20 REM Demo of write-prot
ect check
   30 REM by Martin Phillips
   40 REM for BBC B only wit
h discs
   50 :
   60 IF FNprotect THEN PRIN
T"Write-protected":ELSE PRIN
T"OK"
   70 END
   80 :
   90 DEF FNprotect
  100 REM ?&70 is the drive
number
  110 !&70=0:!&74=&6C0000
  120 A%=&7F:X%=&70:Y%=0:CAL
L &FFF1
  130 =(?&77) AND 8
```

Listing 4. Tests to see if a disc is write-protected

The moral of this is to use these calls with great care and don't take everything you read in books as being correct for all versions of BBC or Electron computers. You might think it does not matter so long as it works on your own machine, but what happens when you want to give a copy to a friend, or even decide to buy a Master?

JARGON BOX

Disassemble This is when machine code is turned back into assembly language. This means that an almost meaningless string of numbers can be turned back into assembler mnemonics which can be understood much more readily. There are programs to do this called disassemblers.

Write-protect sticker This is a foil sticker used to cover a notch on a disc so information on that disc cannot be changed. It is similar to the break-off tab on the back of a cassette which, when removed, will prevent the cassette being recorded over.

DFS Disc Filing System. The chip which handles all the routines for the disc drive.

For Hints and Tips listing 1, see the yellow pages index on page 113

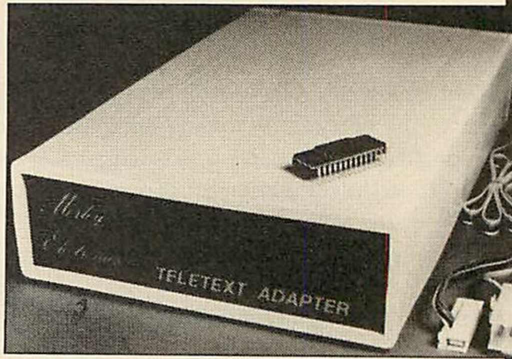
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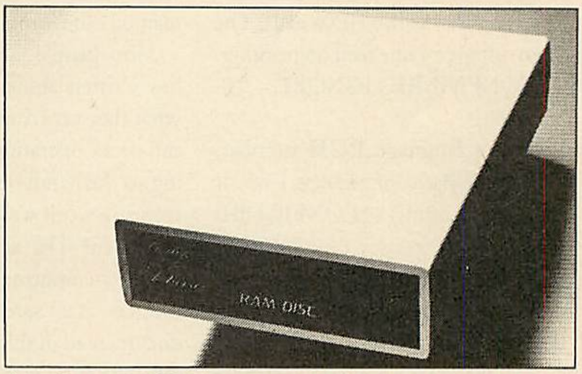
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The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive no. is 4.
'Dangerous' * commands such as *COMPACT, *COPY, *BACKUP etc are intercepted and the BBC's RAM from page 2 to &7FFF is saved to RAMdisc workspace, and may be recovered using a * command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The save operation delays the * command by just under 0.4 seconds. The BBC's RAM can also be saved by an interrupt-driven routine which can be enabled by a * command.
The 'filing system wedge' ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter, verifier and 'sector' editor for use with the RAMdisc.
Catalogue structure allows up to 2,709 files.

APPLICATIONS

Programs and ROMs can be written to take advantage of directly accessing a single RAMdisc, allowing the possibility of spreadsheets with more than 512 × 512 cells, million-character documents with immediate access and editing of any section, manipulation of 2 floating-point arrays each with 228 × 228 elements, a fast-access database with 10,000 100-character records, or even just a large printer buffer!
Accessible through the user's software for direct storage of eg: basic procedures, variables, large arrays etc which can be downloaded into the BBC's RAM or read directly. (We are hoping to be able to supply an extended basic ROM late this year, to allow 'transparent access' to the Ramdisc, which will effectively expand the BBC's RAM to about 1020k.)

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FIRST BYTE

DISC EXPANSION

What is a catalogue and what information does it convey? We give the answers and present a program which allows you to store more files on your discs

Tessie Revivis

The Disc Filing System ROM (or DFS for short) contains all the extra commands needed when you use a disc drive with your BBC micro, Master or Electron. The DFS forms part of the disc interface which is either already fitted to your micro (B+, B+128 and Master) or needs to be installed as an optional extra (BBC B and Electron).

Although many of the commands are straightforward to use, they can provide you with a great deal of information about your files. The catalogue is a fundamental part of any DFS and the purpose of this month's First Byte is to explain how the catalogue is built up and what information it conveys. This article also gives an extremely useful Combiner and Expander program which allows you to store many more files on your discs – even more than any utility ROM could allow you to.

To examine the disc catalogue the DFS command is *CAT, or *. in its abbreviated form. Figure 1 shows how a typical disc catalogue looks on screen – don't take this as gospel because catalogue displays may differ slightly with the various DFSs that are around.

```
Book      (10)
Drive 0                        Option 0   (off)
Dir. :0.$                      Lib. :0.$

   PROG1                          PROG2
   PROG3                          PROG4

  V.CHAP1                       V.CHAP2
  V.CHAP3                       V.CHAP4
```

Figure 1. A typical disc catalogue, where the default directory is set to $

The top line of the catalogue is the disc title. This will only appear if you have titled your disc using the appropriate command, in the case of figure 1.

*TITLE BOOK

There's no need to place the title name in quotes as the command will search for a space to end the title string, but this means you can't use two word titles such as:

*TITLE BOOK ONE

If you need this, insert a hyphen to 'join' the two words together, ie:

*TITLE BOOK-ONE

or, if your DFS will allow, use quotes:

*TITLE "BOOK ONE"

If you have not assigned a title to your disc this part of the line will remain blank. It's a good idea to get into the habit of titling discs as it will remind you of what the disc contents are (if you don't keep a separate record elsewhere).

The number at the end of the line, enclosed in brackets, will normally refer to the number of times you have written to the disc since it was formatted. A 'write operation' is when you save a program or lock a file with *ACCESS, for example. Some DFSs increment this number whenever a disc accessing command is issued; for example, the Solidisk DFS will increment it when you load a file whereas the Acorn DFS does not.

The next line tells you which drive you are reading the catalogue of (in this case Drive 0) and what boot option has been defined – boot is jargon which simply means starting up. For example, the boot option is written to the disc using *OPT 4,n where n is a number. At present there is no boot option set; rather, it is set to 0 and is 'off'. With a formatted disc in your drive type:

*OPT 4,3

The disc will whirr and if you now *CAT the disc you will see that the boot option is set to 3, and the (off) has been replaced with (exec). Now if you press the Shift and Break keys together the DFS will read the disc option and try to *EXEC a file saved on the disc as !BOOT. This file should, of course, be created beforehand using the *BUILD command (see your DFS manual for details). The next line contains details about the current directory and library. Let's examine each in turn.

Directories are worth their weight in gold. If you refer to figure 1 again you'll see that the disc catalogue contains eight files. The first four, PROG1 etc, are all in the 'root' directory, and loading any of these is done simply by typing LOAD "PROG1". The other four files are all prefixed by a 'V.', ie, V.CHAP1 etc, which shows that they have been saved in the V directory. Whenever we wish to load a file from another directory we must specify its full pathname. To enter LOAD "CHAP1" would not be sufficient; we need to enter LOAD "V.CHAP1". The command *DIR allows you to change the current directory. Typing *DIR V will set the current directory to V, so cataloguing the disc will give the result shown in figure 2. Now the files CHAP1 etc, can be loaded straight in, but the programs in the root directory can only be loaded by specifying '$.' in the filename, ie, LOAD "$.PROG1". Notice also that the $ in the third line of the catalogue has changed to V.

It is also possible to set a default directory on a different drive. For example, to set the default directory to Z on drive 2, *DIR :2.Z should be typed (notice that a colon is used to signify a drive number). But what use are directories? Simply, they allow you to organise your files efficiently. For instance, I store all my *View* files in the V directory, all my *Wordwise* files in the W directory, my programs are normally stored in the default directory $ but could be stored in P, and so forth. Thus you don't have to think about whether a file is text or a program – you know by the directory it's stored in!

When using a DFS (Acorn's – others may differ) you are allowed to use the letters A to Z inclusive plus the numbers 0-9 and any other symbols except , * ! . and a space for creating directories and files. The lower case letters a-z can also be used but the DFS cannot differentiate A from a so these are deemed to be the same

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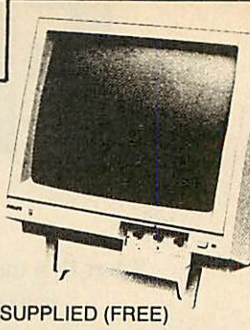
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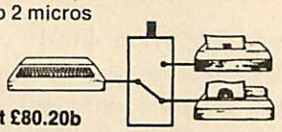


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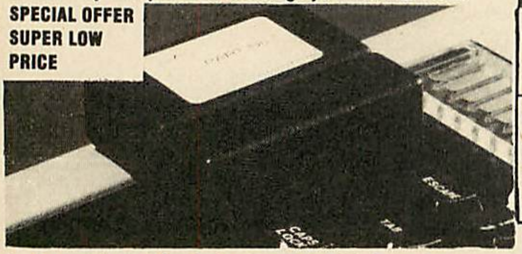
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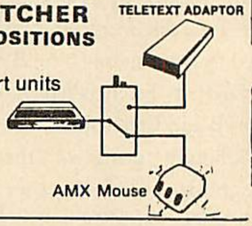
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directory. The newer Advanced DFS (ADFS) takes the directory structure even further so directories may contain directories and so on – see the box at the end of this article.

The final item on the third catalogue line is LIB (short for library) and uses the command *LIB – when used effectively this is a very useful facility. You use *LIB in the same way as *DIR in that you can specify a directory or a drive number and directory – this is the library directory. Into this you can put machine code programs which will load and run a Basic program. Whenever you want to use your machine code program, run it in the normal way, ie, for a machine code program called BELL, type *BELL. The DFS will look for this in the current directory; if it can't find it there it will look in the library directory.

The great thing is that you could have all your machine code utility programs on a single disc in, say, drive 1 on a dual drive system, and this could be used with your current program disc on which you would set the library to *LIB :1.M where the directory M contains the machine code programs.

One slight drawback of some DFSs is that you are limited to just 31 files per disc side, but some allow you to have up to 62 files – though even this is limiting if you have lots of very small programs. One way around this is to combine several listings into a single file, from which programs can be extracted as needed. Listings 1 and 2 on the yellow pages do just this. Written by *Acorn User*'s Technical Assistant, David Acton, they are used in a modified form on *AU*'s monthly listings disc.

Listing 1 is the Combiner: its job is to read in each file from the disc and combine them into a much longer file, which it does by writing each byte of the program to the disc file a byte at a time using the BPUT command. The next program is stored above this in a similar way.

Listing 2 is the Expander: this reads in each program from the combined file and then saves it back to disc as a separate file. This time the procedure PROCoscli is used to read program bytes back from the big file and store them in the computer's memory to re-form the program which it then saves.

Using the two programs is simple enough, so let's work through an example. First, take two newly formatted discs and onto these save five small programs, using the filenames PROG1, PROG2, PROG3, PROG4 and PROG5. The contents of these programs don't matter, anything will do but keep them down to a few lines for now.

Now enter the Combiner program (listing 1). Note that at the end of this listing there are seven lines of data (lines 600 to 660). The first item of data is the filename for the combined file, which I'm calling CORE. The next five lines contain the program names which we want to combine. Finally the last data statement is LAST, which tells the program that there are no more programs to be combined. Run the Combiner program and correct any errors which crop up. The program asks whether you are using dual or single drives – respond accordingly and follow the prompts (single drive users will need to swap discs; dual drive users need to have the 'other' disc in the 'other' drive!).

When the micro's prompt reappears the five PROG files have been written to the single CORE file. If you *CAT the disc you'll see this has been saved as CORE1. This is because several files might be too long to be saved as a single block of memory and so the Combiner program combines them into several files called CORE1, CORE2, CORE3, and so on.

Next, enter the Expander program, which also has several data lines towards the end. Line 1190 contains three data items. The first is simply a title string displayed to remind you what the files are. The second is the name of the combined file name, in this case CORE, and the third item is the number of CORE files, which is 1 in this case (if you had catalogued the disc and found that CORE1 and CORE2 existed, this would be a 2, etc).

The next five data lines contain the filenames of the combined programs, and finally EXIT terminates the expansion process.

To convert both programs to suit your own needs just edit the data statements accordingly. The program as it stands works on five programs – you can, of course, add or delete programs as you wish. It's not vital to use a new disc every time: you can use the same disc for the combining and expanding process. You should use the single drive method (detailed above) and not bother changing discs when you're prompted to.

As an extension, and a little project for you, you could rework the program so it will load an individually chosen program rather than expanding all the programs each time you need only one. To help you, just remember that the start of each program file in a combined file starts with the program name itself. This is followed by two bytes which give the file's length (high byte first) and the program is terminated by &FF.

```
Book      (10)
Drive 0                       Option 0   (off)
Dir. :0.V                     Lib. :0.$

   CHAP1                         CHAP2
   CHAP3                         CHAP4

 $.PROG1                       $.PROG2
 $.PROG3                       $.PROG4
```

Figure 2. A disc with the directory set to V. Note that the $ directory is now a sub-directory

The main feature of the ADFS is its hierarchial filing system. At the base of this hierachy is the file, and these files can be grouped together into a collection of files called a directory. Directories can be given meaningful names which is useful since it allows files to be grouped together logically.

Directories themselves can be grouped together to form sub-directories within directories, and can themselves be grouped into directories, and so on.

For example, suppose you want to put all the programs from *Acorn User* into a directory you might proceed like this: first create a directory called AU using the command CDIR, ie:

*CDIR AU

You enter this directory by typing *DIR AU and once here you can create several more sub-directories, again using *CDIR – you could call these FBYTE, JOTTINGS, HINTS and so on. You can enter these at any time by typing the *DIR name.

When you need to gain access to a particular program it's easy to find. However, you do not have to work your way through each individual directory to get to your program – you can include its path as part of the filename. For example, suppose you had saved the COMBINER program in FBYTE; to load it in you could use the command:

LOAD "AU.FBYTE.COMBINE"

For the Combiner and Expander listings, see the yellow page index on page 113

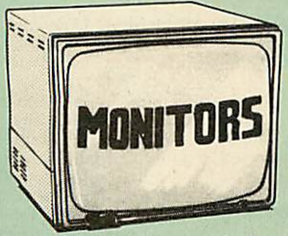
NEW

SEIKOSHA MP1300AI
Professional Printer

This new professional quality NLQ printer's draft mode speed of 300 cps and 50 in NLQ makes it an ideal business printer at a budget price. It can even be upgraded to COLOUR by the simple addition of a "Clip-on/Clip-off" colour Kit (optional).

A give away at only: **£425** (carr. £7)

HITACHI 672 PLOTTER
Only: £450 (Carr £6)



We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

MICROVITEC 14"

- 1431 – Medium resolution as used on the BBC television computer programme **£176**
- 1451 – High resolution, suitable for word processing in mode 0 .... **£225**
- 1441 – High res, exceeds the capabilities of the BBC micro **£365**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£259**
- 2030CS 20" RGB/PAL/Audio **£375**
- 2040CS 20" RGB/PAL/Audio **£655**
- TOUCHTEC Touch Screen Pack **£250**
- Dust Cover for Microvitecs **£5.50**

KAGA/TAXAN 12"

- KAGA KX1201G Hi-res Green Monitor **£90**
- KAGA KX1202G Long persistance Hi-Res Green Monitor **£105**
- KAGA KX1203A Ultra-Hi-Res Amber Monitor **£105**
- KAGA Vision 2, Hi-Res, RGB Colour Monitor **£210**
- **KAGA Super Vision 3,** Ultra Hi-res, RGB Colour; Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£330**
- PHILIPS 12" Hi-Res Amber Monitor **£73**

FIDELITY COLOUR MONITOR

- Medium Resolution, attractively finished, 14" RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen.

£169

ZENITH

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith Micro Systems.)

Green (New Design) Hi-res **£72**
Amber (New Design) Hi-res **£82**

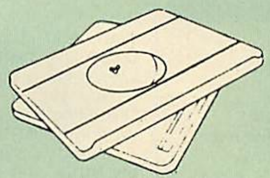
LEADS

BNC Lead for Zenith or Philips **£3**
RGB lead for KAGA **£3**

N.B. Carriage on Monitors **£7** (securicor)

CREDIT CARD
Orders (ACCESS or VISA)
Simply phone
(0923) 33383/50234
24 Hour Ansaphone Service

SWIVEL BASES
for Video Monitors



Adjust your Monitor/VDU, Up, Down, Right or Left to provide utmost in operator flexibility & Viewing comfort. It improves your sight lines & reduces stress & eye, neck and back strain. Available in 2 sizes:

for 12" Monitors **£14** (carr. £2.50)
for 14" Monitors **£16** (carr. £2.50)

SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

2764-250nS £1.85
27128-250nS £2.45

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £3.15
2 x 6264LP (16K) £6.00

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in at our retail shop to discuss your particular requirement and a demonstration.

EXAMPLE PACKAGE
BBC Master 128K Micro, View wordprocessor, Viewsheet, Basic Editor, Terminal Emulator, Twin 800K 40/80 track double sided Disc Drives, Zenith Hi-Res green monitor, Brother HR15LX professional quality Daisy Wheel printer, Gemini Database, Spreadsheet, Beebplot Graphics, Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, and Stock Control packages on disc with manuals.

Only £999

THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

Watford Electronics' Overseas Dealers:

Absolute Electronics, 483 Centre Road, Bentleigh, Victoria, Australia 3204.
Tel: (03) 557 3971

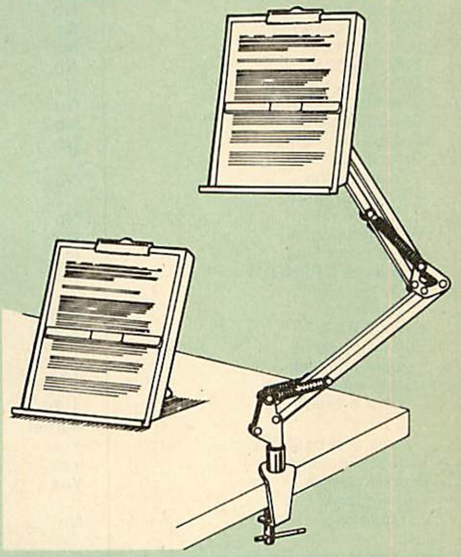
First Ludonics International, 2400 AJ Alphen aan den Ri jn, Nedherlands.
Tel: 01720 72580.

Scientex PVBA, Willem Ogierplaats 2 B-2000 Antwerpen Belgium.
Tel: (03) 233 59 06

Technomatic, Hesselager 13, 2605 Brondby, Denmark.

Viking Tecno, Vestergade 12.1, 9620 Aalestrup, Denmark.
Tel: (08) 642522

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£17** *(carr. £3)*

All prices in this advert are exclusive of VAT.

MARK 2 LIGHT PEN

You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions. It only operates on high frequency light from the TV or Monitor.

The red LED Indicator on the Mk II pen, lights up when valid video data is available. Your program can have access to this signal allowing computer verification of target for high res drawing. The conveniently located switch on the pen body allows the computer to ignore any stray signals. Supplied complete with the sophisticated PEN-PAL Software on Cassette or Disc. Please specify.

Mark II Light Pen **£25**

Continued →

The ULTIMATE DFSs for the BBC MICRO

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)

Just compare the features:

Features	Acorn 1.20	Watford Single Density	Watford Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20	1.43	1.53
	partial	Yes	Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for three years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).

PRICES

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£50**
- *Acorn's 0.90 DFS Kit complete* **£47**
- *DFS Manual (Comprehensive)* (no VAT) **£6.95** *(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)*
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£46**
- *DDFS Manual* (no VAT) **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

Watford Electronics DDFS PLUS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.

Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.

Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation.

DDFS PLUS incorporates all the features of the Watford's popular DFS & DDFS for the BBC B, (at the same time retaining full compatibility with Acorn DFSs), plus it has the following extra features:

Automatic density selection – Full single and double density operations – Extremely powerful and comprehensive OSWORD &7F emulation – Any file can be full size of disc – Density of last access assumed for speed – Automatic 40/80 stepping swapped on error – All *Acorn's extra disc* commands implemented.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.

Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.

The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £30 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!

Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

DDFS PLUS (for BBC Plus) **£30**
(Price includes comprehensive manual)

Special DISC UPGRADE OFFER

Acorn/BBC 100K Single Slimline 40 track Disc Drive and Watford's or Acorn's Single Density Standard Disc Interface Kit complete with Utility Disc and Manual.

Only **£99** (carr. £6)
(Offer valid while stocks last)

All prices Exclusive of VAT

By popular demand our retail shop is now open until 8.00pm. every Thursday.

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

ACORN WINCHESTER DRIVES

Complete with Level 3 File Server Software.

10 Megabyte **£1050.00**
30 Megabyte **£1549.00**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

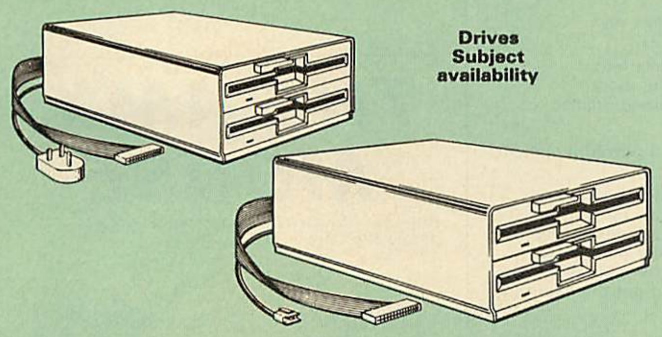
The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). Both are of Japanese manufacture.

With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them.

***All our Disc Drives (except CLS100) are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

When using a BBC Micro, most people find themselves preciously short of space. The Watford's BBC Micro Plinths form an ideal way of recovering some of this space; your BBC, disc drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. Some of our competitors offer disc drives built into plinths, but these aren't as sensible as you might think. With a Watford Plinth, your disc drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen and paper, reference manuals, etc. Follow the trend with Watford Plinth.



Drives Subject availability

Capacity	Drives without P.S.U. Single	Drives without P.S.U. Twin	Drives with P.S.U. Single	Drives with P.S.U. Twin
100K (180K)	CLS 100 £75		CS 100 £116	
200K (360K)	CLS 200 £102	CLD200 £185	CS 200 £116	CD200 £199
400K (720K)	CLS 400 £104 / £105 CLS400S	CLD 400 £185	CS400 £123 / £124 CS 400S	CD400 £205
800K (1.44M)		CLD800 £194 / £195 CLD 800S		CD800 £218 / £219 CD 800S

- TWIN Disc Drive Case, complete with Power Supply & Cables **£35**
  Securicor carriage on Disc Drives £6

Prefix **C** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix **S** *= 40/80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

All our switchable drives now have a smartly mounted **front panel** 40/80 switch for ease of use.

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£11**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£13**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£19**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£20**

- *10 × 3½" S/S D/D 40/80 track Discs* **£25**
- *10 × 3½" D/D D/D 40/80 track Discs* **£35**

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 ×* **M4** *S-S D/D 40 Track Discs* **£10**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£12**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£17**

- *3" Double Sided Discs* **£4** *each*

This month's STAR OFFER

Buy any two packs of the 3M or our own brand TOP QUALITY DISKETTES and we will give you absolutely FREE – yes absolutely FREE – our 5¼" Floppy Disc Head Cleaner Kit.

(Offer valid while stocks last)

Special BULK OFFER on 5¼" DISCS

(Supplied packed in plastic storage Units)
(Lifetime warranty on Discs)

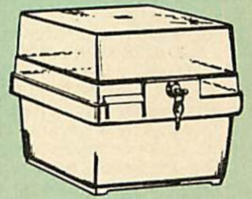
Type	Description	Pack of 20	Pack of 50
M4	Single/Side Double/Density 48TPI	£17	£42
M5	Double/Side Double/Density 48TPI	£21	£56
M7	Double/Side Double/Density 96TPI	£29	£70

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

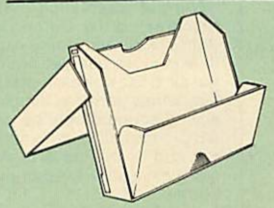
£4

LOCKABLE DISC STORAGE UNITS



Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 - holds upto 40 discs **£9**
M85 – holds upto 95 discs **£11**



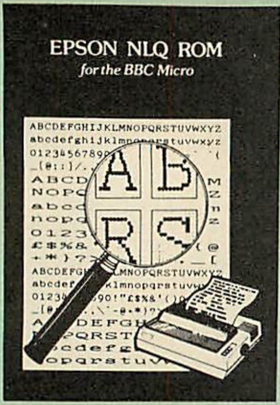
PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£2.00**

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8



Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00
(Hi-View compatible)

THE NLQ DESIGNER

KAGA KP810/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

A 40 or 80 track (please specify) disc containing 3 example fonts is included in the package.

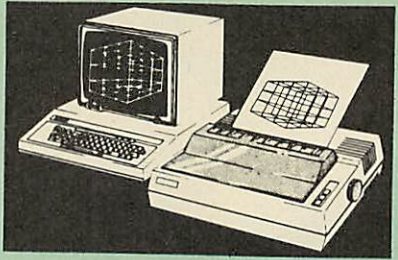
(P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write in for further details).

ALL PRICES EXCLUSIVE OF VAT

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

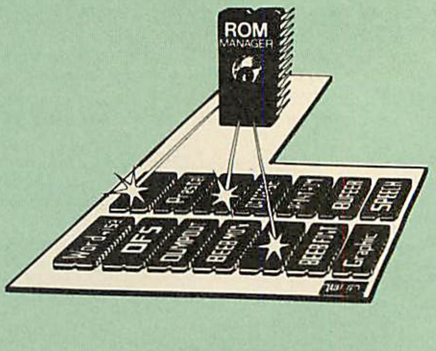
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)
Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.
Many more facilities available.

SPECIAL OFFER £18

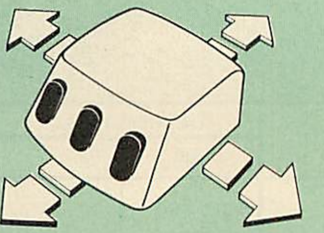
BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software. It allows you to display text on the screen in 13 different styles. It is supplied complete with a Spooler and Editor on 40 or 80 track disc.
(Please write in for technical details).

ONLY **£25**

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £65 (carr £1.50)

AMX DESK Package	£20.00
AMX UTILITY Package	£12.00
AMX SUPERART Package	£43
AMX PAGE-MAKER Pack	£43
AMX 3D ZICON Disc	£21
AMX Database Disc	£21
AMX XAM Educational	£21

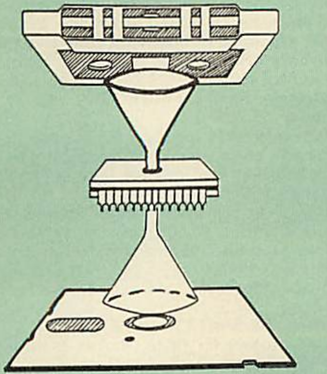
RB12 MARCONI TRACKER BALL

This popular unit is supplied complete with software.

Price: **£50**

TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface. Not compatible with 1770 DFS.

This advanced and sophisticated utility ROM for the BBC Micro has the following features:

- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

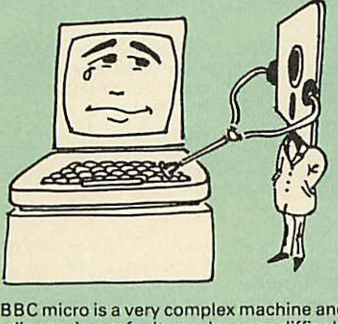
TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

All prices exclusive of VAT

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!



ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£40**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROM-SPELL

"way ahead of any competition"



ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Compatible with: View, Wordwise & Wordwise +.

Don't settle for less, Buy the best.

£25

(Not compatible with 1770 DFS)
(Please state 40 or 80 track disc)

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.

Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

(Write in for technical details.)

£24

DISASSEMBLER ROM

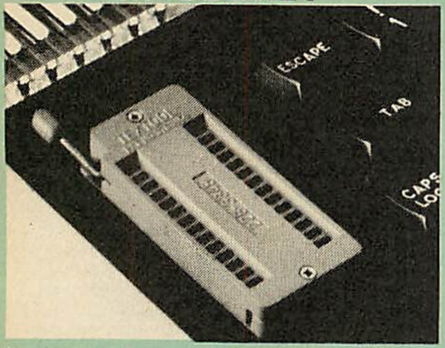
Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

Please write in for technical details.

ONLY **£16**

Continued →

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC B+ compatible. Is ideal for use with KAGA KP810 and GLP printers to allow easy swopping of preprogrammed FONT ROMs.

ONLY **£15** (carr £2)

16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

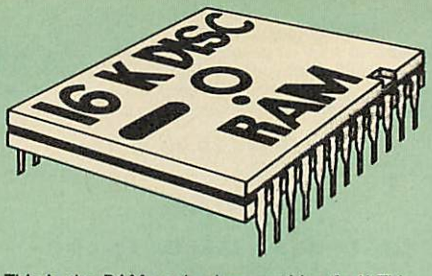
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

All prices exclusive of VAT



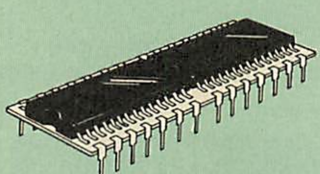
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

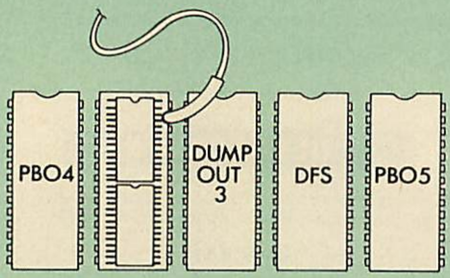
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM





This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)

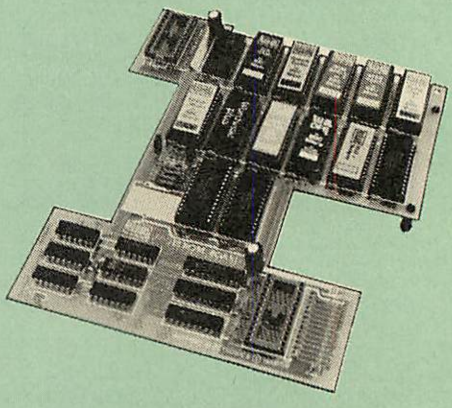
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.
Do you require:

- Sideways RAM for a BBC B? Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 1.
- A small, basic module? Choose 1.
- A sideways RAM module for a ROM board? Choose 1, 2 or 3.
- An easy to use utilities disc? Choose 1, 2 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose 2 (3).
- Write protect for RAM (makes ROM look like RAM)? Choose 2 (3).
- Read protect (allows recovery from crashes)? Choose (3).

Key:
1) Solid State 16k Sideways RAM
2) 16k Disc RAM
3) 16k RAM module

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

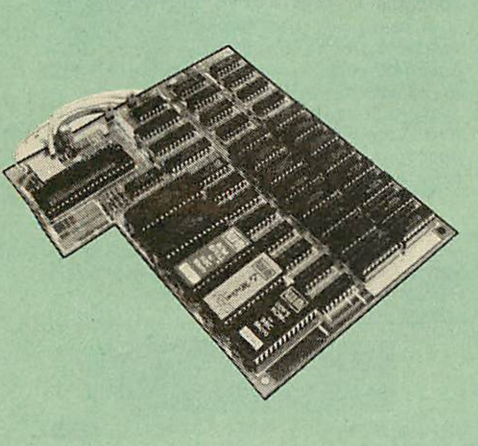
Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

- *ROM/RAM card with 32k dynamic RAM* ***£45***
- *ROM/RAM card with 64k dynamic RAM* ***£69***
- *ROM/RAM card with a massive 128k dynamic RAM* ***£109***

(carriage on ROM/RAM Card £3)

OPTIONAL EXTRAS:

- *16k plug-in Static RAM kit* ***£7***
- *Battery backup* ***£3***
- *Read and Write protect switches* ***£2 each***

Complete ROM/RAM board (all options installed) ***£125***

Le Modem



The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *FREE 3 months subscription to Micronet and FREE registration to MicroLink to start you up.*
- *BBC Master compatible.*
- *BT Approval applied for.*

Price: **£89** (carr £3)

PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual) (Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£115

(carr £3)

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

THURSDAY LATE OPENING

By popular demand, our retail shop will now be open until 8.00pm. every Thursday.

LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £52

Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

£42 (carr. £4)

GLENTOP's 3D GRAPHICS

Development System **£22**

DATAGEM Database

Now compatible with Watford DFS's

Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE.

AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 × 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

£59

BT TELEPHONE CONNECTORS

LJU 1/4A Mini Line Master	**£4.50**
LJU 1/6A Mini Line Slave	**£3.00**
LJU 2/4A Line Master	**£4.00**
LJU 2/6A Line Slave	**£2.50**
LJU 3/4A Flush Master	**£3.95**
LJU 3/6A Flush Slave	**£2.75**
LJU 10/3A Dual Splitter	**£5.50**
4 Way BT Plug	**£0.75**

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	**£51**
CARETAKER Basic Utility	**£27**
Graphics ROM	**£25**
Disc Doctor ROM	**£25**
TERMI	**£27**
COMMUNICATOR	**£58**
SPEECH ROM	**£26**

Wordwise

The most popular Wordprocessor for the BBC Micro.

Special Offer: **£28**

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

£40

INTER CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

ONLY: £26

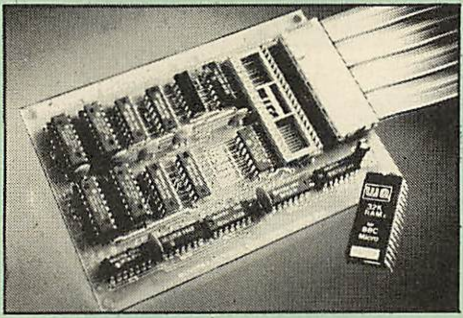
All Prices Exclusive of VAT

GRAPH PAD

With this popular Mk II British Micro's Graph Pad, you can add new dimensions to your computer enjoyment. It helps you to create your own applications programs by the simple use of the Graphpad. Ideal for educational use. Supplied complete with cables, Manual and Software Cassette.

Special Offer £51 (carr £3)

32K SHADOW RAM- Printer Buffer Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B+ or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Ensure COMPATIBILITY with a vast range of hardware (including our ROM board, the ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, Music 500's AMPLE). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable and has the power consumption of a couple of ROMs!
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages, and a comprehensive manual is supplied free.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only: £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, for a limited period only, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.

32K Shadow RAM Card/Printer Buffer and Wordwise Plus (a very powerful package) for the absolutely astounding price of:

Only £75 (carr £2)

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

VIEW

VIEW WORDPROCESSOR 2.1 .... **£39**

VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only **£60**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£38

VIEWSHEET (Acornsoft)	**£39**
VIEWSTORE	**£39**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER HR15 PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

OMNIREADER

OCR at a price you can now afford

The manually operated omnireader is preprogrammed to read 4 common type faces – including: KAGA Courier 10, Courier 12, Letter gothic & Prestige Elite. It reads a line of text in about 3 seconds & is ideal for inputting already typed material into wordprocessor packages, such as View or WW, Databases or Spreadsheets. Comes complete with power supply, instruction manual, longrule & Dustcover. Also available on disc for the BBC is a utility program which merges input from the service port with the keyboard thus allowing full editing control whilst using the omnireader. Also included is a Basic program which displays the pixel map image obtained from the omnireader – ideal for doing your own OCR.

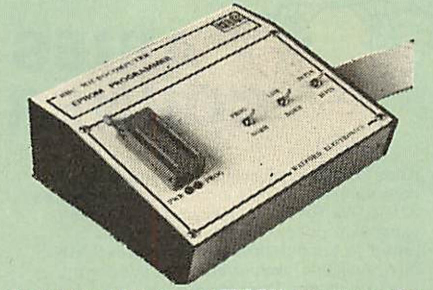
(As seen on the TV programme Micro LIVE)

Price: **£175**

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Language Subroutines	£19.95
6502 Development System	£7.50
68000 Assembly Lang. Programming	£19.95
6800 Machine Code Programming	£12.95
6800 Programming the	£22.95
A User Guide to Wordwise Plus	£9.95
A Young persons Guide to BBC Basic	£5.95
Advanced Disc User Guide	£14.95
Advanced BASIC ROM User Guide	£9.95
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£13.50
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£11.50
Advanced Programming Techniques for the BBC Micro	£8.95
Adventure into BBC BASIC	£6.95
Applied Assembly Lang. for BBC	£9.95
Assembler Routines for the 6502	£7.95
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Language Programming on the BBC & Electron	£8.95
Basic Programming on the BBC Micro	£6.95
Basic ROM User Guide	£11.95
Basic User Guide for BBC Micro	£10.00
BBC B+ User Guide	£14.95
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Machine Code Portfolio	£7.95
BBC Micro add on guide	£7.95
BBC Micro Advanced Reference Guide	£10.95
BBC Micro Advanced Programming	£9.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro ROM Book	£9.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Disc Companion	£8.95
BBC User Guide	£10.00
BBC Wargaming	£8.95
BCPL User Guide	£14
Business Applications on BBC	£7.95
Complete FORTH	£6.95
CP/M - 86 User's Guide	£19.95
CP/M Bible	£16.50
CP/M Handbook with MPM	£9.95
CP/M Plus Handbook	£13.95
CP/M Soul of	£16.50
CP/M The software BUS	£8.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£9.95
Discovering BBC Micro Machine Code	£6.95
Disc System for the BBC Micro	£6.95
Exploring FORTH	£6.95
Filing System & Databases for the BBC Micro	£7.95
FORTH on the BBC Micro	£7.50
Functional Forth for the BBC Micro	£5.95
Graphics for Children	£6.95
Graphs & Charts on BBC Micro	£7.50
Guide to BBC ROM	£9.95
Hackers Handbook	£4.95
Hackers Handbook - New	£6.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Interfacing & Robotics on BBC	£15.95
Interfacing Your BBC Micro	£8.95
Into View	£4.50
Introduction to COMAL	£9.50
Introduction to LOGO	£6.95
Introducing 'C'	£9.95
Introducing CP/M on the BBC Micro Z80 2nd Processor	£9.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£17.95
ISO-PASCAL Reference Manual	£9.95
Let your BBC teach u to program	£5.45
LISP 2nd Edition	£14.95
LISP, A Beginners Guide to	£10.95
Logo Programming	£9.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£17.95
Master Advance Reference Manual	£19.95
Master Reference Manual Part 1	£14.95
Master Reference Manual Part 2	£14.95
Micronet Handbook	£6.95
Programming the 6502	£16.95
Programming the Z80	£19.95
Sencing & Control Projects for BBC	£5.95
S-PASCAL on BBC Micro	£7.50
Structured Basic	£7.95
Structured Prog. with BBC BASIC	£6.50
Termulator Manual	£4.95
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Turtle Graphics on BBC Micro	£7.50
Using Floppy Discs with BBC Micro	£5.95
View Guide	£4.50
Viewsheet User Guide	£10
Using BBC Basic	£4.95
Wordstar & CP/M made easy	£7.45
Wordwise Plus Guide	£9.95
Z80 Assembly Language Programming	£19.95

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:

Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.

Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

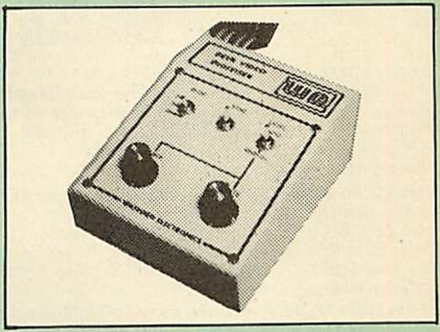
SPECIAL OFFER £69 (£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

BEEB VIDEO DIGITISER



Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£110 (Carr. £3)

(Price includes: Digitiser Unit, Software in ROM & a Comprehensive Manual)

Magazine Maker

(As seen on TV)

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£129.00** (carr. £3)

Continued

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock value, current gross margin, cost of bringing stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21**
(Cassette or Disc)

Money Management

This disc based software allows individual transactions to be stored and retrieved for upto 5 Bank a/c and 5 Loan accounts.

Price: Only **£11**

L.B.O. Rom
Life & Business Organiser

Features include:

- Automatic reminder of entries overdue for attention.
- One week's advance notice of forthcoming events.
- Urgent notice board.
- Creation of categories of entries; e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day.
- Month AND week's summary at a glance, indicating time booked and free.
- Single entry of a RANGE of events and updating of regular happenings.
- Super search facility to call any event by any related word or part word.
- Month by month preview of all forthcoming events.
- Built-in intelligent calendar.
- All data saved to disk.
- Full printer support.
- Easy to follow documentation.

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

Price only: £17
(Also available on DISK)

D D D Suite Integrated Software System

-BASE **£25**
-CALC **£25**
-PLOT **£25**
COMBO PACK All 3 together **£56**

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS
- WORD PROCESSOR

Database – Set up a computerised "card index" system and add record/data to the file your way. Features include search, sort, mathematical calculations, printer routines, data summaries, etc.

SPREADSHEET – Offers a wide range of invaluable calculation and editing features. Beebplot will take files created by Beebcalc to provide data portrayal in graph, histogram or pie chart format.

BEEBPLOT – Provides an easily assimilated visual representation of numerical data.

WORDPROCESSOR – Provides many routines found in large and expensive packages.

OFFICE MATE Only £10
(Cassette or Disc)

ARIES CORNER

Aries Computers was the first company to commercially market what is now known as SHADOW RAM. As part of it's continued expansion policy, Watford Electronics is proud to announce that the Aries range is now available exclusively from Watford Electronics and their dealers.

The Aries range, designed by experts offers you the solution to your upgrade nightmares. All the Aries products are compatible with double density disc controllers, modems, second processors, ECONET, hard discs, EPROM programmers and of course, other members of the Aries family and most of the much wider Watford family (some products advertised here perform identical functions and hence cannot be used together). Several major companies now test all their products to ensure compatibility with the Aries B20 & B32.

In quality of construction, the Aries range sits alongside the Watford range in setting a standard against which others are judged. Custom made connectors eliminate the damage to the BBC machine caused by inferior products.

The Aries B-32 Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20; the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many othr applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2).

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) sofket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on he board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM are advertised elsewhere in our advert.

Price:
Aries B-12 **£40.** Aries B-12C **£5**

THE ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

THE ARIES RANGE HARDWARE REQUIREMENTS

Aries B-32 – BBC B, MOS 1.20, hardware plugs into CPU socket.
Aries B-12 – BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£16**
Delta 14B Single Joystick	**£12**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc/Tape	**£7**

ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

Price: **£2**

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£8.75**

Replacement FLEXIBLE KEYBOARD CONNECTOR

A 'Keyboard to Micro' replacement jumper lead.

£4

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£13** (£2 carr.)

DATA CASSETTES

Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20.**

SPARES for BBC Micro

Keyboard	**£46;**	Keystrip	**£2**
UHF Modulator	**£4;**	Case	**£25**
Speaker Grill	**£1;**	Speaker	**£2**
		Keyswitch	**£2**

8way DIP SWITCH **£0.85**

CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**

DISC DRIVE POWER LEADS
Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

DISC DRIVE INTERFACE LEADS
BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	110p	215p
BBC Power Plug 6 way	80p	–
Disc Drive Plug 4 way	75p	–
BBC Power Socket 6 way	80p	–

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234/33383

النور
ARABIC ROM
for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

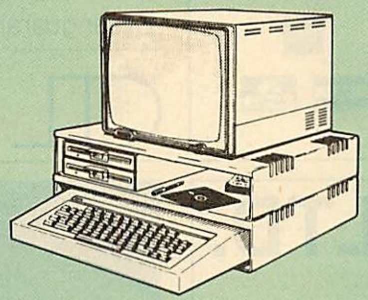
20, 40 and 80 column operation. Compatible with ASMO (449). English/Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

£85

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

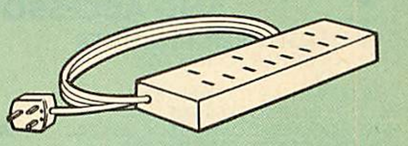
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£25** (carr £2.00)

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

£9.50 (carr £1.50)

ACORN MUSIC 500

The Acorn Music 500 System is probably the most powerful piece of music generating hardware available for the BBC Micro.

£95 *(carr £4)*

28 pin ZIF SOCKET (Textool) **£6.95**

28pin DIL HEADER PLUG

SOLDER type	**£1.50**
IDC CRIMP type	**£1.95**

RIBBON CABLE

28way **55p/ft;** 34way **60p/ft.**

SOLDERING IRON

Soldering Iron (Antex 17 Watt), Ideal for electronics PCB work	**£6**
Soldering Iron Stand	**£2**
18 SWG Solder in dispenser	**£1**
22 SWG Solder in dispenser	**£1.50**

CHIP SHOP

2764-250nS	**£2.00**
27128-250nS	**£3.00**
4013	**60p**
4020	**£0.90**
4816 RAM	**£1.00**
6264LP-8K RAM	**£3.75**
6502A CPU	**£5**
65C02 CMOS	**£10.00**
6512A	**£10.00**
6522	**£3.40**
6522A	**£5.00**
6845SP	**£6.00**
7438	**40p**
74LS00	**25p**
74LS04	**25p**
74LS10	**25p**
74LS123	**80p**
74LS163	**70p**
74LS244	**80p**
74LS245	**£1.00**
74LS373	**£1.00**
74LS393	**£1.00**
8271	**£36**
DS3691	**£3.50**
DS88LS120	**£3.00**
LM324	**£0.45**
SN76489	**£5.50**
SAA5050	**£8.75**
UPD7002	**£4.40**

ASSORTED ROMS

ACORN BASIC 2	**£19**
ACORN ADFS	**£25**
ACORN DNFS	**£17**
Acorn OS 1.2	**£6**
Acorn BCPL	**£42**
Basic Editor	**£25**
Acorn COMAL	**£36**
Acorn FORTH	**£32**
Acorn Graphics	**£25**
Acorn LISP	**£35**
Acorn LOGO	**£42**
ISO Pascal	**£42**
ICON Master	**£28**
Logotron LOGO	**£55**
Micro Prolog	**£64**
Microtext ROM	**£48**
ROMIT	**£29**
Serial ULA	**£13**
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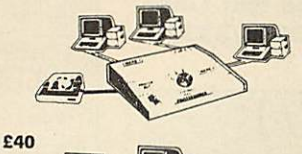
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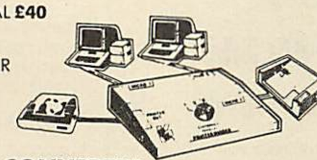
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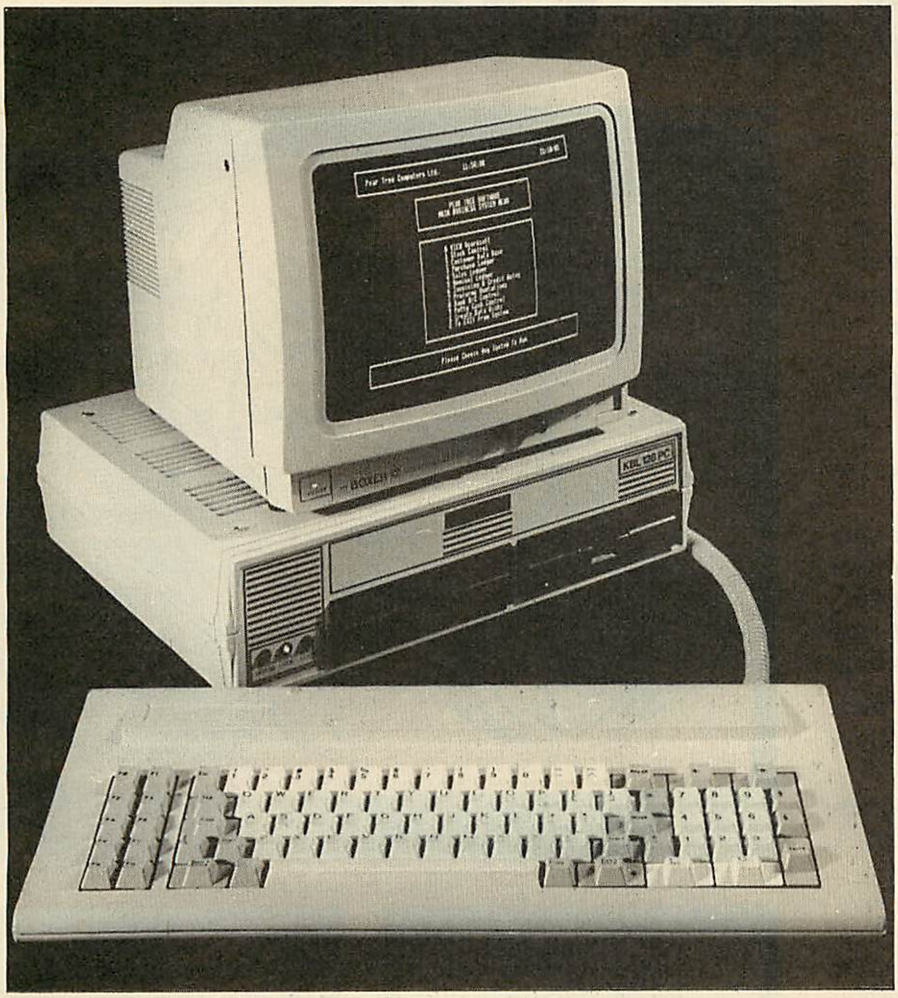
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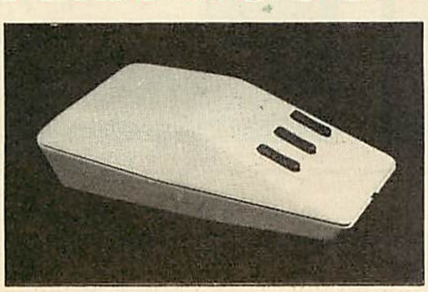
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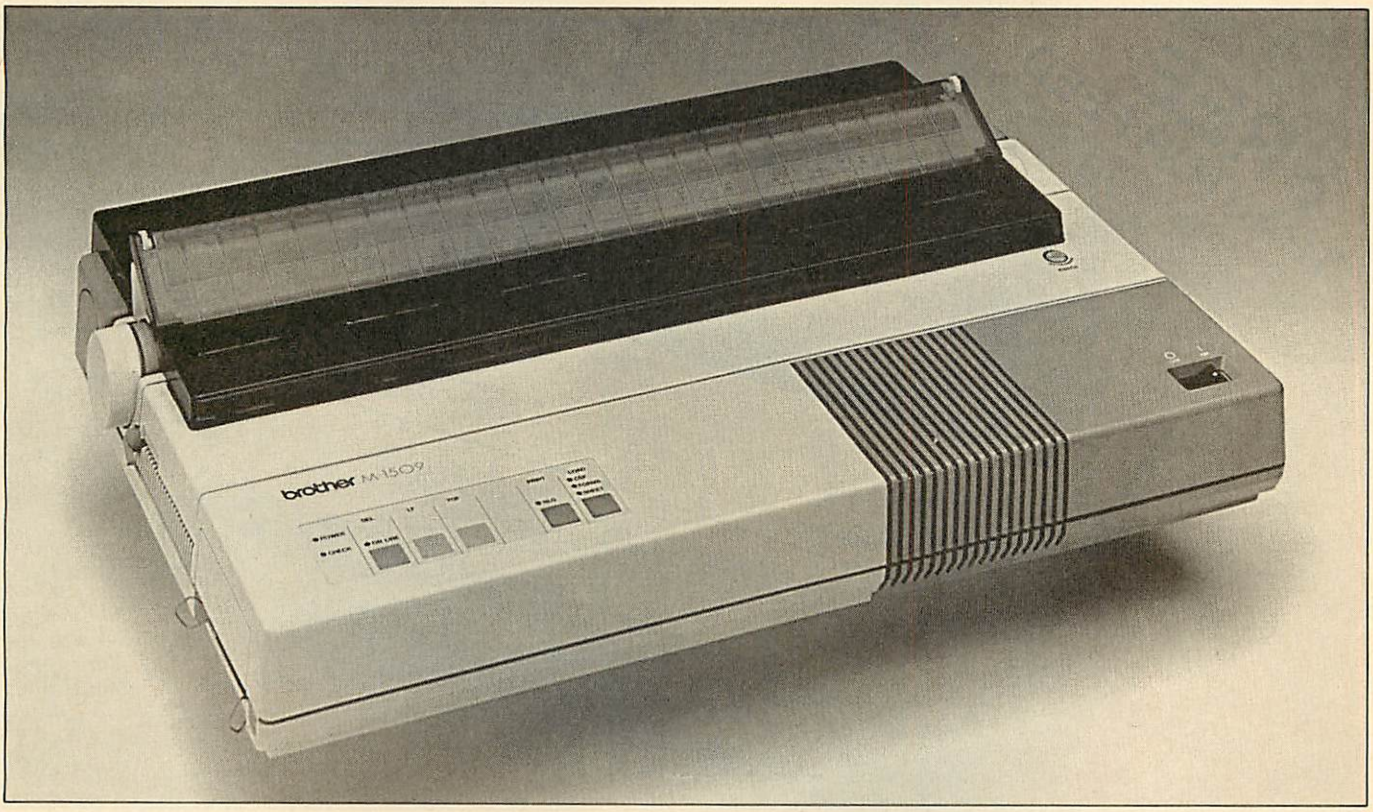
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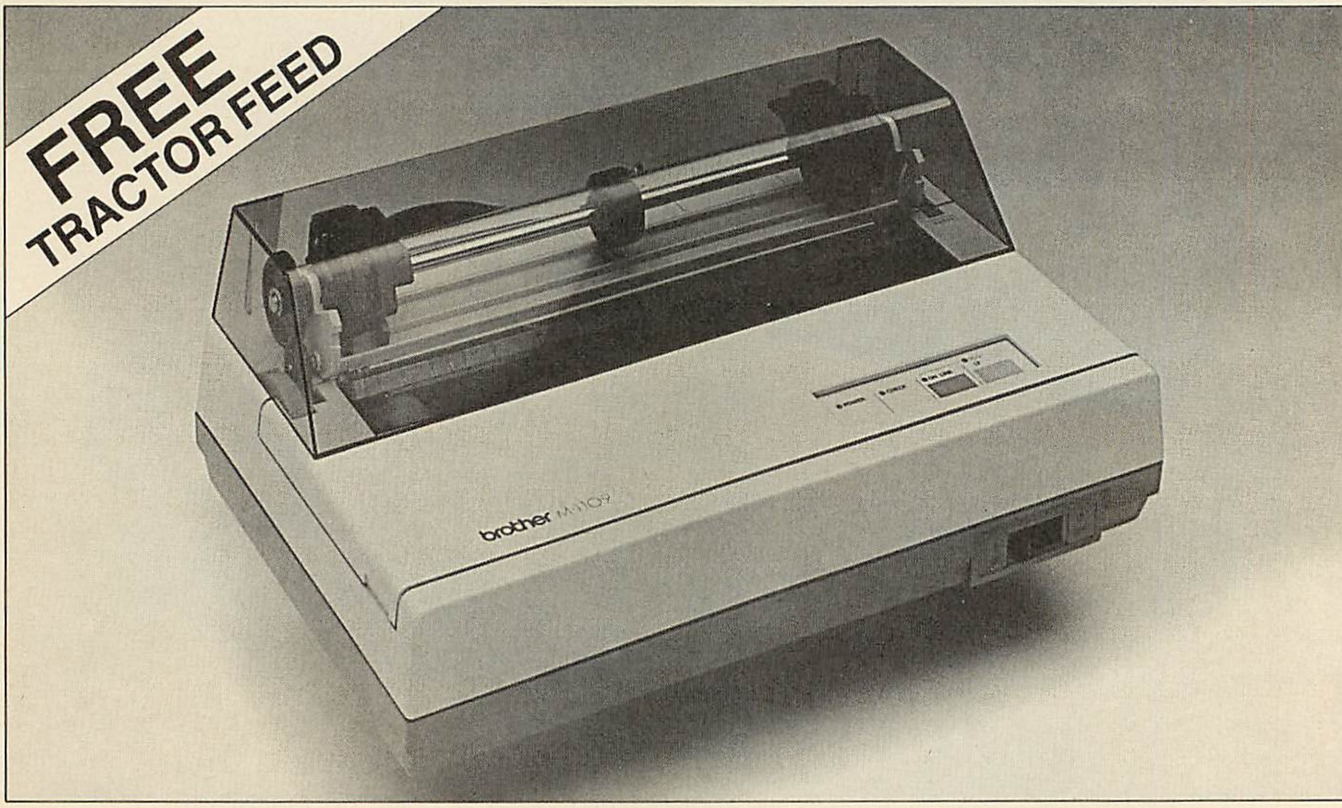
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THE LETTER BOX PUZZLES



You've seen wordsearch puzzles in popular magazines, now you can solve and design your own with the help of these programs

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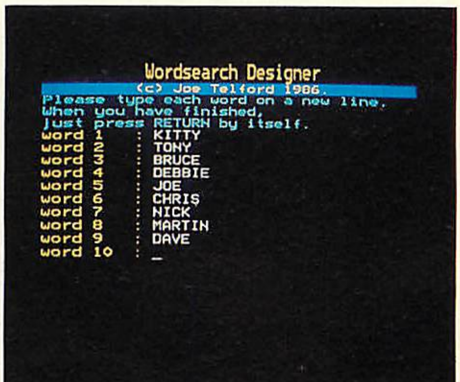
Wordsearches, a popular ingredient in the puzzle magazines of the 'strain your brain' variety, consist of two elements: a grid and a list of words. A wordsearch grid is an array of capital letters, usually in a square or rectangle with between 10 and 20 letters on a side. The accompanying list contains a number of words (usually in alphabetical order) which are hidden in the grid and must be found and ringed.

This months's listings are a program to solve wordsearch puzzles, and another to design your own wordsearch grid. But before we look at the computer versions, let's look at the make-up of a wordsquare and analyse strategies for its solutions.

Figure 1 is a typical wordsquare, a nine-by-nine grid containing the numbers from ZERO to THIRTEEN. Notice that the 14 words contain a total of 63 letters, while the grid itself has 81 letters. Every wordsearch grid has slightly more letters than the total in the list, with the extra letters distributed among the 'blank' spaces to make the puzzle more complex. Obviously, the longest side of the grid (or both sides if it's a square) must be at least as long as the longest word.



Figure 1. Orientation of words on the grid



Entering the words you want included in the puzzle

Look again at figure 1. The words inside a wordsearch grid can be found in any of eight directions:

1 to right	THREE
2 to left	THIRTEEN
3 downward	FIVE
4 upward	FOUR
5 up & right	TWO
6 down & right	ZERO
7 down & left	SEVEN
8 up & left	(no example)

The problems presented to the puzzle solver are caused by disorientation of the words, overlapping of words and the sheer numbers of letters.

Strategies for wordsearching

It seems that few people sit down and develop an effective strategy to solve wordsearch grids. One approach is not to hunt for a particular word, but to scan the grid for groups of letters which seem to be word parts. These are then extended to their limit and the resulting words checked against the word list. Looking at figure 1 shows a slight flaw in this common strategy. The words NET, KEEP, DEN, NUT, and TAR are all found within the grid, by accidental alignment of letters. Puzzlers using this strategy often find far more words than exist on the list, and hence much more time and effort is required.

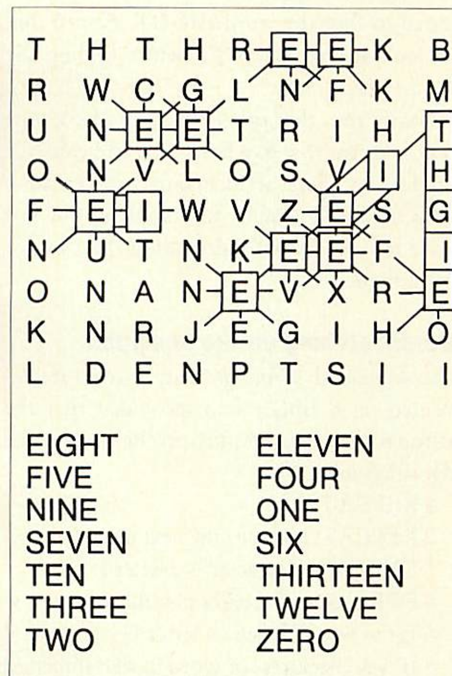


Figure 2. Example of a sequential search

A strategy with a higher success rate is the sequential search. Starting in the top left corner we hunt, letter by letter and row by row, for the first letter of the first word on the list. Once this is found, we scan the eight letters around it to see if one is the second letter of the word. If it's not, we return to scanning the grid for the first letter. If the second letter is found this gives us a direction to concentrate on, and we can scan along that line comparing letter for letter, until we either fail to match a



letter or succeed in matching all the letters, in which case we have found the word and we can mark it.

Look at figure 2 (the same wordsearch grid as in figure 1) for an example of a sequential search to find the word EIGHT. Notice that we look at nine letters Es before finding the correct one.

Notice too, that two of these Es have an I next to them (row five letter two and row five letter seven). Such accidental occurences make the search take longer to complete, but not make it more difficult, providing the strategy is followed.

Wordsearching on the computer

The sequential search strategy can be implemented on a BBC micro, provided that the instructions are sufficiently precise. A possible algorithm might be:

1 REPEAT
2 REPEAT: move to the next character
3 UNTIL the character is a letter E
4 FOR each of the eight possible directions
5 Is the next character a letter I?
6 IF yes check rest of word in that direction and STOP if OK
7 Go on to the NEXT direction
8 UNTIL all the letters have been checked, or the word is found

It is fairly easy to generate the code for this strategy, and the outcome of it is shown on the partly filled wordsearch grid of figure 3. Notice how all the letter Es are shown along with the word EIGHT which has been found.

```
.  .  .  .  .  E  E  .  .
.  .  .  .  .  .  .  .  .
.  .  E  E  .  .  .  .  T
.  .  .  .  .  .  .  .  H
.  E  .  .  .  .  E  .  G
.  .  .  .  .  E  E  .  I
.  .  .  .  E  .  .  .  E
.  .  .  .  E  .  .  .  .
.  .  E  .  .  .  .  .  .
```

Figure 3. Interpretation of a sequential search

Look at figure 4. This is a Robinson Crusoe wordsearch from a primary school magazine. The letter searches of figures 5a, 5b and 5c show how the computer can give clues to particular words without disclosing their positions. In figure 5a there are 11 possible ISLANDs; refining the search by looking for IS combinations gives five possibles, of which shortage of space will remove two. The final three ISLANDs are reduced to one by searching for the letter L as in figure 5c.

This sort of letter search simply speeds up the mechanical task of searching, yet allows us to use our brains in considering how the search will be refined.

Figure 5d shows the result of a search for a particular word. Really, this is best used at



Fitting 'Joe' into the grid

```
H Q C Z N H G M F L T A
J I A R U O R O E I L Z
K T L T U O S I A L R E
D L E L T S N N E T V E
N A N S A A O R I I S A
A N D R D E B E T B T E
L G A C O M O A R G O S
S I R K U C N F M J P R
I S S H I P W R E C K R
F H F R I D A Y U D A N
F O O T P R I N T F I G
H C A E B C L O T H E S
```

BEACH	CALENDAR
CLOTHES	CORN
CRUSOE	DANIEL
DEFOE	FIRE
FOOTPRINT	FRIDAY
GOAT	HILL
HUT	ISLAND
NATIVE	POTS
RAFT	ROBINSON
SEA	SHIPWRECK
SIGNAL	STORM
UMBRELLA	

Figure 4. The 'Robinson Crusoe' wordsearch

frustration point, or in the case of grids without associated word lists, when the puzzler wishes to test whether a particular word exists in the grid.

Finally, a complete wordsearch can be used to confirm that all the words on the list can be found (one or two grids I have encountered over the past two months have words missing or incorrectly spelled). This facility is useful in checking wordgrids designed by young children – or Bruce Smith!

Wordsearch solving program

As usual with programs which perform seemingly simple tasks, a good deal of writing effort has to go into the housekeeping side, as well as the grid-solving side.

The program has been designed to be compatible with *View* and *Wordwise,* so that users with these wordprocessors can edit grids and word lists without rewriting. The facilities I felt were required are split into the following three sections: data entry, searching and data presentation.

Data entry

Taking a grid and word list from a typical puzzle magazine we should be able to:

- Type the grid line by line into the Beeb
- Save the grid to disc for later use
- Type the words into the computer
- Save them for later use

The format of the saved information should be in *View/Wordwise/**TYPE format.

Search

The grid should be searchable in the three ways outlined above – letter search, search for a single word and complete wordsearch. It should be possible to blank the target grid whenever a new letter grid is typed, or whenever you want, so that separate searches can be seen clearly.

Data presentation

All of the information, word list, letter grid and target grid should be previewable and printable at any time, providing that they exist.

These features mean that quite a lengthy program is called for and this is given as the Wordsearch Solver listing in the yellow pages. The program will operate on BBC B, B+ and Master 128 computers. It will also function within a second or co-processor. File handling on Econet and tape will be slow, but should be OK. DFS, ADFS and ANFS should provide fast file handling.

Type the program in, save it on disc as "SOLVER" and lock it with *ACCESS SOLVER L (DFS) or *ACCESS SOLVER LR (ADFS). When it is run (type CHAIN

"SOLVER"), a menu will appear with 15 choices. Pressing Escape at any time will return us to this menu, and although Break will kill the program, the legal exit is via menu option 15 which ends the program. Here are the other options in detail:

1 Load Letter Grid The first time you run the program, you will have to enter a letter grid from a puzzle. Press '1' from the menu and answer the next question 'Use a word grid file?' by pressing 'N'. The screen clears and you should follow the instructions given. You must type each line without spaces, and press Return by itself to end the input session. This section had no editor. To alter your grid, either press Escape, reselect 1 from the menu and re-enter, or complete the grid and save it to disc then edit it in *View* or *Wordwise*. The largest grid which the program can handle is 29 rows of 29 characters.

If a letter grid is already saved then loading is can be done by answering 'Y' to the question 'Use a word grid file?' then typing the name of the file, including any extension, eg, L.NOS.

Once a letter grid is typed or loaded the target grid is set automatically to that size, and blanks are inserted.

2 Save Letter Grid option gives a prompt for a filename. I tend to use L.XXXX for letter grids, so the numbers grid was saved as L.NOS and the Robinson Crusoe grid was L.CRU. If the filename which you type already exists, you are warned and returned to the main menu.

3 Load Word List is similar to option 1, except that you should type the full word list accompanying the wordsearch grid. The program can handle up to 79 words. Again the word list can be loaded from disc by answering the question 'Use an existing wordfile?' with 'Y' then typing the name of the wordfile, including any extension, eg, W.NOS.

4 Save Word List is similar to option 2 except that you should use the directory extension W, for example W.CRU and W.NOS. This separates the two types of data.

5 Find Letter gives the prompt 'Find Letter?'. Type the letter to search for and press Return. The number of matches will be displayed opposite the letter. The position of the letters can be seen using option 9.

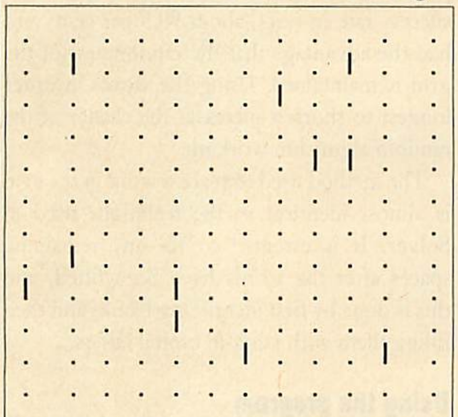


Figure 5a. Starting to look for the word 'island'

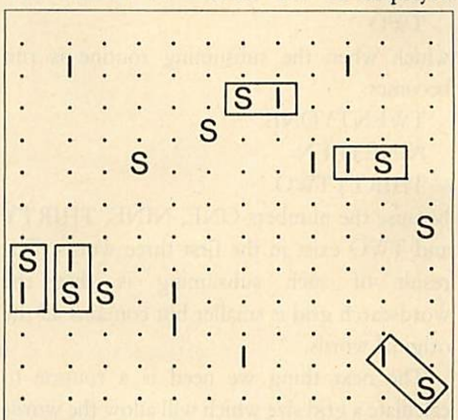


Figure 5b. Narrowing down the search

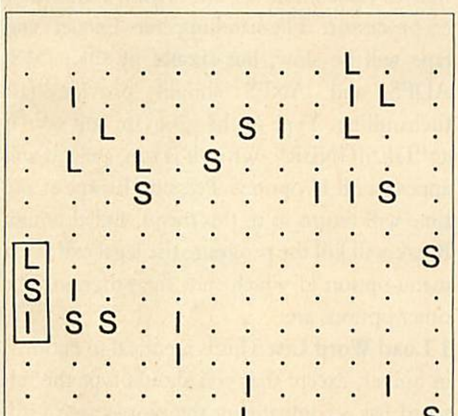


Figure 5c. The only possibility

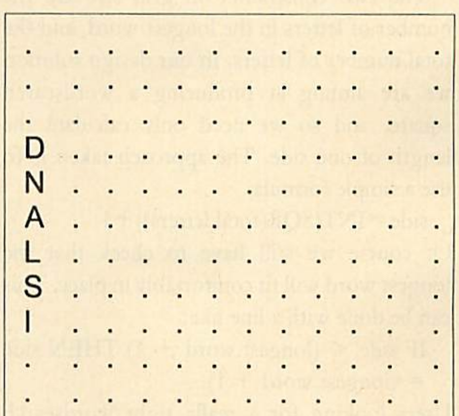


Figure 5d. The whole word is revealed

6 Find Word gives the prompt 'Find Word?'. Type the word to search for and press Return. If the word is found a message '. . . Found' will appear, otherwise the message '. . . Not found' will appear. The position of the word can be seen using option 9.

7 Solve Grid Pressing option 7 starts the solving procedure, and each word in turn is found and displayed on the grid. At the end, they may be further previewed using option 9.

8 Blank Target Grid This option occurs whenever a grid is loaded, or on demand by pressing 8. Use it whenever you wish to clear the target grid for a further search.

9 Preview Target Grid Press option 9 and the current state of the target grid will be displayed on a clear screen.

10 Print Target Grid prints the target grid on an appropriate parallel printer. The spacing between letters is increased to improve the layout of the grid.

11 Preview Letter Grid This option previews the current letter grid, in a similar way to option 9.

12 Print Letter Grid prints the letter grid, in a similar way to option 10.

13 Preview Word List previews the word list with two words to a line. Paging is turned on and scrolling is via the Shift keys.

14 Print Word List This option prints the word list, two words to a line.

Using a wordprocessor

Although the program is self-contained, it may be useful to be able to transfer files into a wordprocessor for 'tweaking'. The file structure within the program is compatible with spooled *Wordwise* files, *View* files without justification, formatting or rulers, and *TYPE files. For example *TYPE L.NOS would display L.NOS in a readable form, as too would *TYPE W.CRU

Both letter grids and word lists can be loaded into wordprocessors, and then edited and resaved.

Any wordsearch file saved from a wordprocessor must obey the following two rules: it must *not* begin with a blank line, and it *must* end with one blank line.

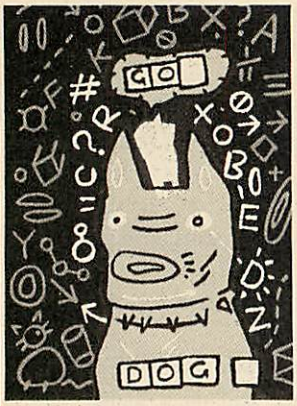
Using *Wordwise:*

- Load as normal into *Wordwise*
- Process using one line per word or letter grid line
- No embedded commands or initial blank lines
- Ensure that there is one ending blank line
- SPOOL back to disc with the correct filename

Using *View:*

- NEW *View*
- READ filename into *View*
- Process using one line per word or letter grid line
- No embedded commands, rulers or initial blank lines
- Ensure that there is one ending blank line
- SAVE back to disc with the correct filename

The same wordprocessor compatibility is maintained for the designer program below, and the same rules apply.



Design your own wordsearches

The second listing on the yellow pages enables you to design a wordsearch puzzle, and incorporates many of the features of the Solver programs. It seemed logical to use the same menu structure, and retain much of the core of the original program. The facilities they have in common are:

1 Enter words
2 Save words
5 Save letter grid
6 Preview the target grid
7 Print the target grid
8 Preview the word list
9 Print the word list
10 Exit

There is no need to print or preview the letter grid because this does not exist.

This left only two facilities which would need writing from scratch:

3 Alphabetical sort of words
4 The actual creation of the grid

although some slight amendments to the other procedures were required.

The first process necessary to convert the raw words into a word search puzzle is to sort them alphabetically. With a list of up to 79 words this can be done quite simply with an exchange sort. (This idea scans through the list of words and finds the first one alphabetically. This is then exchanged with the first word in the list. The next scan starts with the second word, and this is replaced with the next alphabetically ordered word. This procedure goes on until all the words are sorted.)

The task of designing the grid is given over to the BBC micro, and falls into six stages:

- Re-sort the words according to length
- Subsume small words into longer ones
- Calculate the size of the grid
- Prepare a blank grid
- Fit the words into the grid
- Pad the remaining letter spaces with random letters

The reason for re-sorting the words by length is so that the list is more easily managable. Also, the longest word will always be first in the list, and this can be used in the calculations concerning the grid size. The other value in having the list sorted by length is that it makes the pruning of existing wordparts much easier.

In making the wordsearch grid, it saves space if small words which can be found in larger words are removed before fitting. This can be done by taking each word in turn, from the smallest to the largest, and checking whether it exists in all the larger words in the list. If it does then it is simply deleted, and the word list compacted. A typical example might be the word list:

TWENTYONE
NINETEEN
THIRTYTWO
ONE
NINE
THIRTY
TWO

which when the subsuming routine is run becomes:

TWENTYONE
NINETEEN
THIRTYTWO

because the numbers ONE, NINE, THIRTY and TWO exist in the first three words. The result of such subsuming is that the wordsearch grid is smaller but contains all the original words.

The next thing we need is a routine to calculate a grid size which will allow the words to be tightly fitted.

The two constraints on grid size are the number of letters in the longest word, and the total number of letters. In our design solution we are aiming at producing a wordsearch square, and so we need only calculate the length of one side. The approach taken is to use a simple formula:

side=INT(SQR(total.letters))+1

Of course we still have to check that the longest word will fit comfortably in place. This can be done with a line like:

IF side < (longest.word + 1) THEN side = (longest.word + 1)

Users looking for a really tight wordsearch grid might like to delete all the +1s in the calculations but this will increase the number of tries needed to complete the grid.

Once the size of the grid is defined it can be blanked in the same way that we blanked the target grid in Solver.

Filling the grid

There are two ways of fitting words into a grid. The first is to do it randomly, so that each word is chosen in turn then the following algorithm applied:

1 REPEAT
2 Choose start row at random
3 Choose start character position at random
4 Choose random direction from 1 to 8 to lay-in the word
5 Check along the grid that each letter is matched to either a blank or the same letter (laid in a previous word)
6 UNTIL successful.

This approach works fine with an empty grid but slows down tremendously as the grid fills up with letters.

The second way is to take each word in turn and fit it, starting at the first available space working top-left to bottom-right. This tends to work fine, but produces predictable grids. The approach which we use is to give the first algorithm as many tries as there are letters in the grid, and then if unsuccessful, apply the second algorithm until the word is fitted or all positions fail. This has given a very high success rate in tests (about 99.5 per cent) and had the advantage that the randomness of the grid is maintained. Using the words in order longest to shortest increases the chance of the random algorithm working.

The method used to place a word in the grid is almost identical to the technique used in Solver. It is essential to fill any remaining spaces after the words have been fitted, and this is done by first identifying blanks and then filling them with random capital letters.

Using the program

The program will operate on BBC B, B+ and Master 128 computers, and within a second or co-processor. File-handling on Econet and tape will be slow, but should be OK. DFS, ADFS and ANFS should provide fast filehandling. Type in the program and save it as "DESIGNER". When it is run, a menu will appear with 11 options. Pressing Escape at any time will return us to this menu, and although Break will kill the program, the legal exit is via menu option 11 which ends the program. The other options are:

1 Load Word List This is identical to option 3 in Solver, except that you should type the full word list accompanying the wordsearch grid. The program can handle up to 79 words. Again the word list can be loaded from disc by answering the question 'Use an existing wordfile?' with 'Y' then typing the name of the wordfile, including any extension, eg, W.NOS. This routine is normally the first one called from the menu.

3 Sort Word List Once the list is entered it should be sorted into alphabetical order. Option 3 does this swiftly.

2 Save Word List is identical to option 4 in Solver. Remember that you should use the directory extension W, for example W.CRU and W.NOS. This separates the two types of data. It is important to save the word list after

alphabetic sorting, because in the next step in the process the list may alter as parts are subsumed.

4 Design Letter Grid Pressing option 4 starts the design process, with messages to keep us updated on the state of play. Eventually the words will be fitted into the grid and each new word will be previewed. At this stage, we need to get a feeling for the randomness of the layout of the grid. If it is not to your liking then simply press option 4 until a satisfactory layout is achieved.

5 Save Letter Grid prompts for a filename. Remember to use L.XXXX as the filename for letter grids. If the filename which you type already exists, you are warned and returned to the main menu.

6 Preview Grid Press option 6 and the current state of the grid will be displayed for you on a clear screen.

7 Print Target Grid prints the target grid on an appropriate parallel printer. The spacing between letters is increased to improve the layout of the grid.

8 Preview Word List Option 8 previews the word list whenever required. It is displayed at two words per line.

9 Print Word List This option prints the word list, set out with two words to a line, to a parallel printer.

10 Reset If you become confused then option 10 restarts the program, clearing memory as it does this.

Routines

(S=line numbers in Solver program; D=Designr program)

PROCoscar (350-390 S, 310-350 D)
Performs OSCLI for Basic 1 users.

PROCerr (410-450 S, 370-410 D)
Tidies up and traps Escape. It also handles 'real' errors.

PROCfindall (470-560 S)
This procedure finds each word in turn and comments on the success of finding that word.

PROCfindword (580-640 S)
Gets a word input and calls FNfind to try to map it to the target grid.

FNfind (660-740 S)
Returns TRUE or FALSE depending on whether the word selected is found. Uses FNcheck2.

FNcheck2 (760-860 S)
Checks the word in each of the eight directions using a function for each direction.

FNcheckd, FNcheckr, etc (950-1690 S, 1020-1760 D)
The eight individual direction checking routines for matching words.

PROCmap (880-930 S, 950-1000 D)
Routine to place a word on the target grid.

PROCfindletters (1710-1810 S)
Finds all occurrences of the input letter, and maps them to the target grid.

PROCwrdview (1830-1930 S, 1780-1880 D)
Previews or prints a word list.

PROCgridview (1950-2070 S)
Previews or prints a letter grid.

PROCpreview (2090-2210 S, 1900-2010 D)
Previews or prints the target grid.

PROCblank (2230-2310 S, 2030-2100 D)
Blanks the target grid.

PROCtitle (2330-2420 S, 2120-2210 D)
Prints the title.

FNmenu (2440-2650 S, 2230-2400 D)
Prints the menu and returns the option to the main program.

PROCenterarray (2670-2800 S)
Selects letter entry from keyboard or file.

PROCtypearray (2820-3000 S)
Allows entry of letter grid from keyboard, or via *EXEC from file.

```
Y E N T E R A R R A Y A L E D
S E U F I T W O R D S P A C E
D W S P C Y Y A R R A E P Y T
M E A D F H S A V E W O R D S
S A L P R I E T A E R C D A P
E A P E W O N C M R A C S O N
Z F V W T E W D K E P A D T E
I I L E E E I T L F N J R Y M
S N B L A I C V R E I U O P U
C D D L A R V H E O T T W E S
L W K M A D R D E R S T R W B
A O C D G N N A I C P F E O U
C R E E R R K I Y R K I T R S
P D H T I T L E F J G R N D S
B R C W E I V D R W Y Q E S C

BLANK          CALCSIZE
CHECK          CHECKD
CHECKFIT       CHECKR
CREATE         DELAY
DELETE         ENTERARRAY
ENTERWORDS     ERR
FIND           FINDALL
FINDLETTERS    FINDWORD
FIT            FITWORDS
GRIDVIEW       MAP
MENU           OSCAR
PAD            PREVIEW
SAVEARRAY      SAVEWORDS
SORTWORDS      SPACE
SPC            SUBSUME
SWAP           TITLE
TYPEARRAY      TYPEWORDS
WRDVIEW        YES
```

Figure 6. Wordsearch based on routines in Solver and Designer

PROCsavearray (3020-3160 S, 2420-2580 D)
Saves a letter grid to file.

FNyes (3180-3210 S, 2600-2630 D)
Returns TRUE or FALSE to a question requiring a Y/N answer.

PROCentwords (3270-3400 S, 2690-2830 D)
Selects word entry from keyboard or from file.

PROCtypewords (3420-3580 S, 2850-3010 D)
Allows entry of word list from keyboard or from file via *EXEC.

PROCsavewords (3600-3740 S, 3030-3180 D)
Saves a word list to file.

PROCspc (3760-3780 S, 3200-3220 D)
Tidies a screen line to prevent scrolling or overwritten characters.

PROCdelay (3800-3840 S, 3240-3280 D)
Gives a delay of up to three seconds, can be cancelled by hitting any key. Sounds a beep.

PROCpad (430-530 D)
Pads out blanks with capital letters.

PROCfitwords (550-650 D)
Selects each word in turn and passes it for fitting to FNfit.

FNfit (670-810 D)
Fits each word in turn using the random sequential algorithms. Calls heavily on FNcheckfit.

FNcheckfit (830-930 D)
Selects the appropriate checking routine for the direction chosen, and calls it. Uses FNcheckd to FNcheckr.

PROCsortwords (3300-3420 D)
Sorts words by length or alphabetically.

PROCswap (3440-3490 D)
Swaps words to perform the sort.

PROCsubsume (3510-3640 D)
Looks for any short words which are part of longer ones.

PROCdelete (3660-3740 D)
Deletes the short words that are found by PROCsubsume.

PROCcalcsize (3760-3880 D)
Calculates the grid size given the number of letters and the length of the longest word.

PROCcreate (3900-3980 D)
Calls the appropriate procedures in sequence to create the word grid.

PROCspace (4000-4040 D)
Library utility to press space bar to continue.

Conclusion

As usual you are invited to better these poor routines and send in your own wordsearches. Who knows, perhaps a puzzle magazine will buy your computer wordsearches and make you rich ever after. While you are waiting, figure 6 is a wordsearch grid whose words include all the procedures named in the two programs. Happy hunting!

For Joe Telford's wordsearch Solver and Designer listings see yellow pages index on page 113

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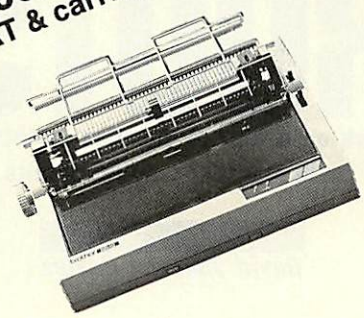
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BACK TO THE ROOTS

Embark on a tour of complex mathematics with magical graphic results

David Johnson-Davies

When an elementary method for solving a mathematical equation is applied to a certain class of function, the behaviour is unexpectedly complicated and intricate. This article shows how this behaviour can be explored and illustrated graphically on the BBC computer.

The resulting curves have outstanding beauty and symmetry, and their intricate structure is still present when parts of them are magnified any number of times.

For example, each of the photographs in figure 1a-d shows a successive enlargement of the area identified in the previous photograph. The reappearance of the same features at higher magnifications is characteristic of a class of objects known as fractals: they were defined by Mandelbrot (see references at the end of this article) as objects whose appearance remains fragmented or irregular at any magnification, and the shapes have many similarities to the Mandelbrot Set plots described in May's issue. In addition to their fractal behaviour, these plots have some other very peculiar properties which will be explained later.

Some appreciation of complex arithmetic will be necessary to understand how these plots arise, but those who wish to avoid the mathematics can jump directly to the section headed 'Plotting the route to each root', or to the listings on the yellow pages, and use the programs to try an experimental approach to investigating the curves.



Figure 1. Generated by listing 2. Each shows successive enlargements of an area from (a) top left. 1(a) takes about ten minutes to generate. The values to generate these are given on page 95

Finding roots of an equation

The starting point for obtaining these curves is the Newton-Raphson method for finding the roots of an equation, often used to implement mathematical functions, such as cube root, on computers. In this article we are just going to consider functions that are called 'polynomials in x'. They consist of a series of terms which are multiples of powers of x, and the 'order' of a polynomial is the highest power of x present. The 'roots' of a polynomial p(x) are the values of x for which $p(x)=0$, and an order N polynomial will have n roots. For example:

$$p(x) = x^3 + 2x^2 - x - 2 = 0$$

is an order–3 polynomial equation which has three roots.

We can see what the roots are if the polynomial is factorised into the product of three terms as follows:

$$(x-1)(x+1)(x+2) = 0$$

Since, if any term is zero, the whole equation will be zero, the three roots are $x=1$, $x=-1$ and $x=-2$. Putting each of these values for x in the left-hand-side of the original equation will give the result 0, showing that they do indeed satisfy the equation.

The Newton-Raphson method for finding the roots of an equation gives a method which, starting with an estimate for the value of the required root, produces a new estimate which is usually much closer to the root. By repeating the process, or iterating the function, we can end up as close to the root as we like. If j is one estimate, the new estimate k is given by:

$$k = j - \frac{p(x)}{p'(x)}$$

where $p'(x)$ is the differential of the polynomial

in x. This can be obtained from the original polynomial p(x) simply by replacing each occurrence of x^n by $n*(x^{n-1})$, and omitting constant terms. Thus the differential of the polynomial p(x) given above is:

$$p'(x) = 3x^2 + 4x - 1$$

As an example, the Newton-Raphson method can be used to find the cube root of any number n. To do this we need to solve:

$$x^3 = n$$

or

$$x^3 - n = 0$$

In other words:

$$p(x) = x^3 - n$$

and

$$p'(x) = 3x^2$$

so from each estimate j we derive a closer estimate k, given by:

$$k = j - \frac{j^3 - n}{3j^2}$$

A simple Basic routine based on this equation demonstrates how effective it is:

```
 10 INPUT "CUBE ROOT ",N
 20 PRINT "= ",FNCUBRT(N)
 30 END
 40 DEF FNCUBRT(N)
 50 LOCAL J,K
 60 K=(N+1)/2
 70 REPEAT J=K
 80 K=J-(J*J*J-N)/(3*J*J)
 90 UNTIL ABS(K-J) < 1E-9
100 =K

>RUN
CUBE ROOT ?3
=          1.44224957
```

The equation is iterated until the difference between two successive terms is insignificant (less than 10^{-9}).

The starting estimate is chosen as (N+1)/2, but in fact with almost any starting estimate the iteration very rapidly converges to the cube root of N.

However, if the method is used to find the roots of the first equation we mentioned:

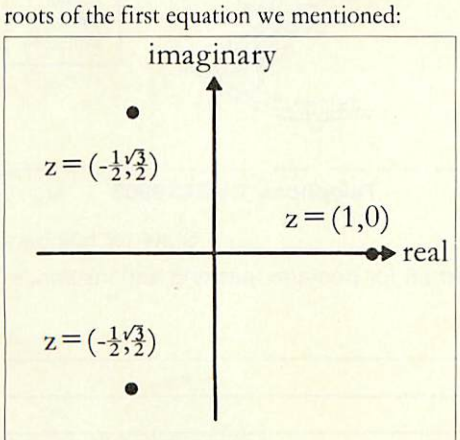


Figure 2. The three roots of $x^3 = 1$, shown on an Argand diagram

$$x^3 + 2x^2 - x - 2 = 0$$

it would find all three roots, depending on which one was closest to the starting estimate K. The equation $x^3 = n$ is also an order-3 equation, so why is only one root found?

In the search for the solution to this apparent anomaly we will encouter 'imaginary numbers', and be led to the fractal curves which are the subject of this article.

Imaginary numbers

In the 16th century mathematicians recognised that certain problems arise when trying to solve apparently simple equations; eg, to find the cube roots of 1 we want to solve:

$$x^3 = 1$$

or

$$x^3 - 1 = 0$$

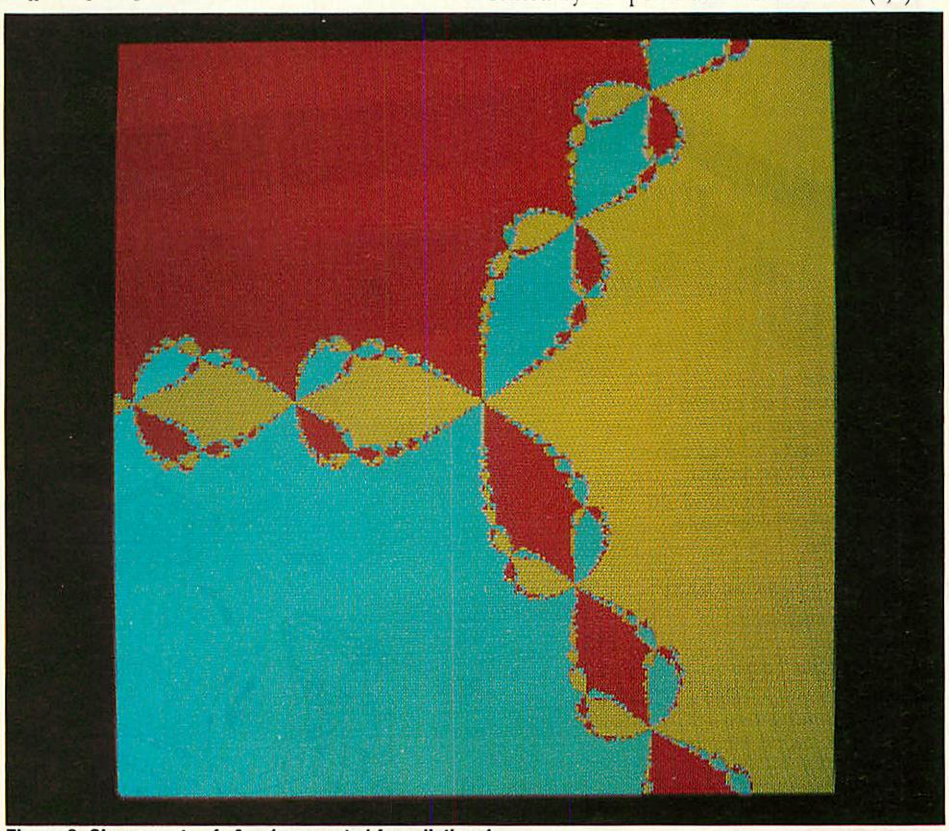


Figure 3. Shows roots of $x^3 = 1$ generated from listing 1

As this is an order-3 equation, three roots are expected. Unfortunately, any attempts to simply factorise the equation into three terms fail. All we get in the end is two terms; one corresponding to the obvious root x=1, and an order-2 term:

$$(x-1\ (x^2 + x + 1) = 0$$

The solution to this stumbling block was to propose the existence of an 'imaginary' number, ie, defined such that $i^2 = -1$. With the help of 'i' the above equation can now be fully factorised into:

$$(x-1)\ (2x+1+\sqrt{3}i)\ (2x+1x\sqrt{3}i) = 0$$

When this is multiplied out, terms containing just 'i' cancel out, and where terms contain 'i^2', this can be replaced by '−1', giving the original equation. The three roots are thus:

$$x=1$$
$$x=-1/2+\sqrt{3}i/2 \text{ and}$$
$$x=-1/2-\sqrt{3}i/2$$

Two of the roots are described as 'complex roots' because they consist of a mixture of a 'real' part, −1/2, and an imaginary part which has to be expressed in terms of i.

A convenient graphical way of representing complex numbers plots them on what is called an Argand diagram, with the real part along the x-axis and the imaginary part along the y-axis. From now on we will refer to a complex number as:

$$z = a + bi = (a,b)$$

where a and b are the real and imaginary parts respectively. This complex number is represented by the point with co-ordinates (a,b) on the Argand diagram. The three roots of $x^3 = 1$ can then be represented as shown in figure 2.

Complex arithmetic in Basic

The rules for arithmetic with complex numbers look quite complicated, but follow directly from the rule that $i^2 = -1$. If (x,y) and (u,v) are two complex numbers:

$$(x,y) + (u,v) = (x+u,\ y+v)$$
$$(x,y) - (u,v) = (x-u,\ y-v)$$
$$(x,y) * (u,v) = (x*u - y*v,\ x*v + y*u)$$
$$(x,y) / (u,v) = ((x*u+y*v) / (u*u+v*v),\ (y*u-x*v) / (u*u+v*v))$$

These functions can be programmed in BBC Basic as follows. Because a complex number consists of two parts, and Basic functions can

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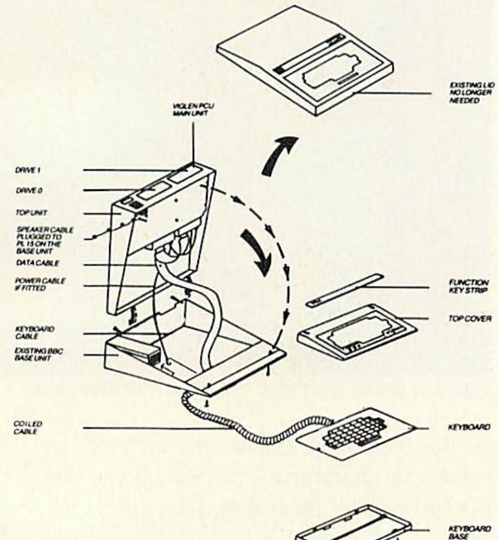
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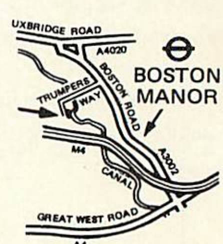
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only return one value, PROCs are used for the operations with one operand being passed to the procedure as the parameters u and v, and the other in variables x and y.

The variables x and y also contain the result on exit from each routine:

```
240 DEF PROCplus(u,v)
250 x=x+u:y=y+v:ENDPROC
260:
270 DEF PROCtimes(u,v): LOCAL t
280 t=x*u-y*v: y=x*v+y*u: x=t:
ENDPROC
290:
300 DEF PROCdivide(u,v): LOCAL t,d
310 d=u*u+v*v: t=x*u+y*v:
y=(y*u-x*v)/d: x=t/d: ENDPROC
```

For subtraction, simply use

```
PROCplus(-u,-v)
```

Plotting the route to each root

With complex arithmetic, can we now use the Newton-Raphson method to find all three roots of the equation $x^3=1$? The answer is yes, and as before, if our initial estimate is close to one root, the method will find that root. Graphically speaking, on the Argand diagram successive estimates will get closer and closer to one of the three points which are illustrated in figure 2.

However, the method yields interesting and curious behaviour if we start with an estimate that is almost the same distance from two different roots; it is as if the method cannot quite decide which root to go towards. Figure 3 shows this in a striking way: for any given starting point (x,y), keep applying the Newton-Raphson method until you end up close to one of the three roots of $x^3=1$, and then colour the point yellow, red, or blue depending on which root is found.

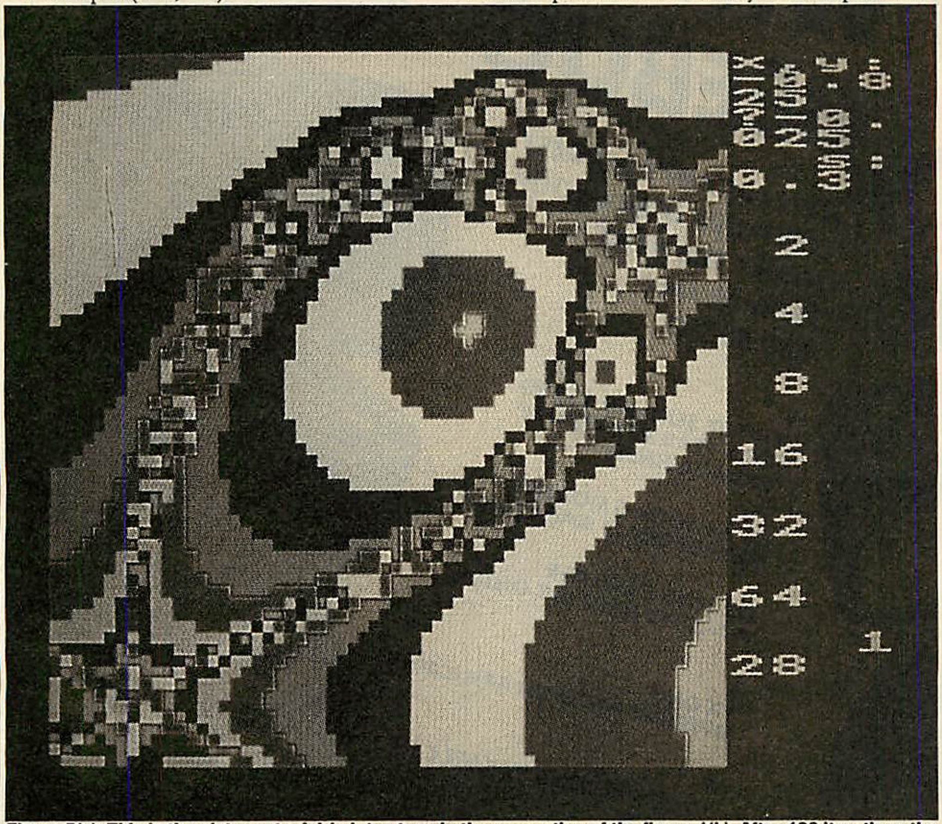


Figure 5(a). This is the picture at a fairly late stage in the generation of the figure 1(b). After 128 iterations the resultant plot can be recognised

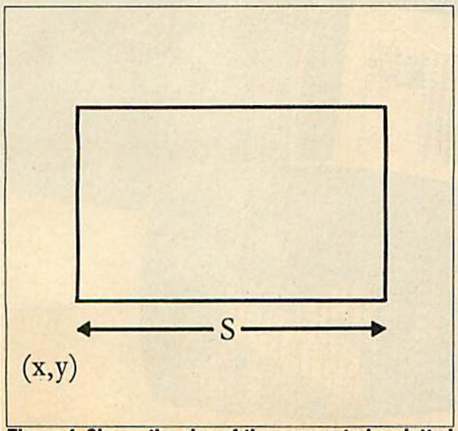


Figure 4. Shows the size of the square to be plotted by listing 1

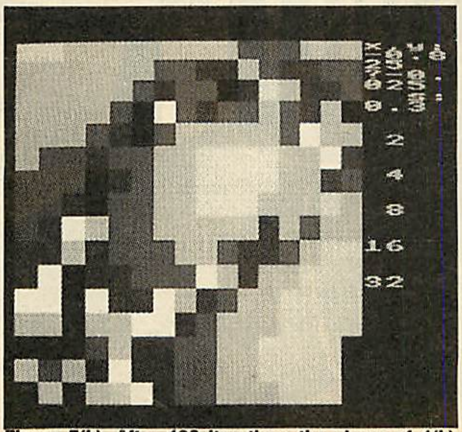


Figure 5(b). After 128 iterations the shape of 1(b) can just be made out

This program to produce this plot is given in listing 1 on the yellow pages. This plots in higher resolution than the remaining programs in this article, and takes correspondingly longer to run to completion. With a second processor expect to wait about $4\frac{1}{2}$ hours, or over 30 per cent longer on a standard BBC B. That's a long time to wait to see if the program's working. For this reason it uses the same rather unusual method of plotting the points on the display as the Mandelbrot set programs, so that a coarse, lower-resolution view of the whole picture can be seen quite quickly. This is so you can get a general idea of what's going on.

Instead of plotting each of the pixels individually, starting at one corner and scanning the display, it 'tiles' the display, first with four 128×128 squares, then with sixteen 32×32 squares, each time filling the square with the colour of the pixel in the lower left-hand corner (lines 490-510).

The test on line 170 ensures that each of the 128×128 values is actually only calculated once, so that the program takes only marginally longer than plotting individual pixels in strict sequence.

The main program begins on line 60. It first sets up a text window (line 80), and then prompts for the bottom left-hand point of the square to be plotted, x and y, and the size of the square is shown in figure 4.

The plot in figure 3 shows the result for (x,y) = (−1.5,−1.5) with side s=3, thus showing all three roots.

For each point in the 256×256 area the program calls PROCpt which calculates the co-ordinates (x,y) of the next point to be plotted and calls FNn for that point.

This iterates the formula, derived from the Newton-Raphson method:

$$w = (x,y) = z - \frac{2^3 - 1}{3z^2}$$

$$= \frac{2z^3 + 1}{3z^2}$$

where w is a complex number representing the new estimate, and z is the previous one. The function returns when z^3-1 reaches a very small absolute value 'e', indicating that the point z is close to one of the roots of the equation. The function then returns the values 1, 2, or 3, for the complex roots (1,0), $(-1/2,+\sqrt{3}/2)$, and $(-1/2,-3\sqrt{2})$, and the corresponding colour is then plotted at that point, given by screen co-ordinates X%,Y%.

One property of this plot, which follows


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from the mathematics of the equation, is that each of the three coloured regions in figure 3 has exactly the same shape; in other words, if you were to pick up the red region and rotate it 120 degrees anti-clockwise, it would then exactly overlap the green region.

A less obvious and more curious property of this graph also follows from complex analysis of the equation: at every point where two colours meet, the *third* colour also meets! In other words, there is no line which forms the border between two colours; there are just points where all three colours touch. If you try to create such a shape with pencil and paper, it turns out to be very difficult, but you can very simply convince yourself that figure 3 is a solution: find any region that looks like a border between just two colours, and then plot an enlarged view of that region.

Convergence to roots

So far we have investigated which root is found by the Newton-Raphson method, given a particular starting-point or starting estimate. Another question of interest is the number of iterations needed to get within a certain distance of one of the roots. By assigning colours to the number of iterations, these colours can be plotted as a function of the starting point to give sets of contours. These contours can be thought of as showing how 'far' every point is from one of the three roots of the equation.

The resulting plots, drawn by the program in listing 2, are the beautiful examples of fractal curves shown in figure 1. Each plot is an enlargement of the square region in the previous plot of the series, revealing details at higher magnifications that mirror the shapes present at lower ones.

In figure 1a the origin (0,0) is at the centre of the plot, and the three roots are the three black dots forming an equilateral triangle centred on the origin. Each pair of roots is separated by a region of 'indecision' or instability; starting-points lying in this region take many more iterations to reach one of the roots. However, as the enlarged plot in figure 1b shows, within each region of instability are circular islands of stability, which are again relatively few steps away from a root. Figure 5 shows a stage in the generation of figure 1.

Again, the program plots the function for a square whose co-ordinates and size can be specified, in the same way as for the program NEWTON1 in listing 1, and it uses the same 'tiling' method of plotting to give a low-resolution view of the whole plot first. The time taken to complete a plot varies, depending on the region being plotted, from under 1½ hours for figure 1a.

The program can be used to plot either with

THE MANDELBROT SET

This is the second article on the graphical display of complex mathematical functions and equations by David Johnson-Davies. The first, on the Mandelbrot set, was carried in the May issue of *Acorn User* and generated a lot of reader interest. Unfortunately, however, two errors crept in. These have, of course, been carried in the Blunderbox on the Noticeboard page, but are repeated here just in case.

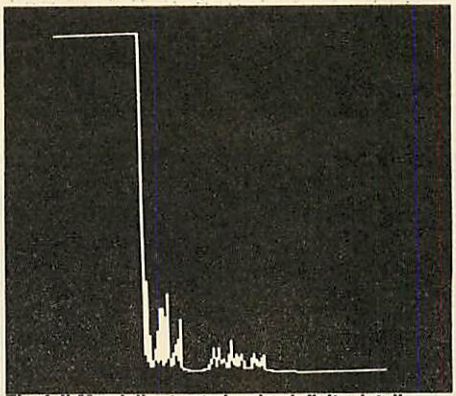
First, reference is made on page 81 of the May issue to listing 1 in the yellow pages which was used to create figure 3 in the article showing erratic behaviour of a fractal nature (ie, the more you look the more detail you see). This was missed out and so is now reproduced below.

Then, in listing 3 on page 114 in the May issue, the variable Q% in lines 90 and 110 should be changed to q (ie, a real variable rather than a integer) thus:

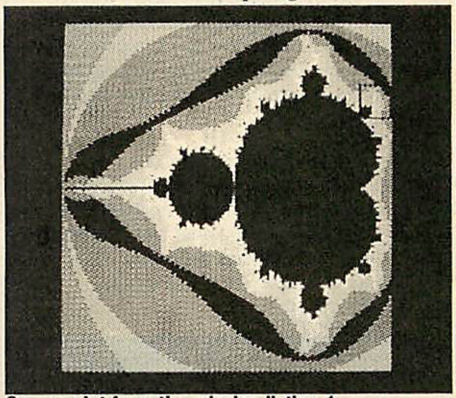
```
90 INPUT "   s:" q
110 H=q/128
```

The listing as printed will run, but not produce a proper display. Both listings 1 and 3 are correctly reproduced on the May listings disc and cassette.

Apologies to David Johnson-Davies and thanks to M Jennions of Norwich and Mr Crenell of Didcot who were quick to let us know. Thanks also to Paul B Moss who wrote to us from Oman. He pointed out that the data files generated by MANDEL2 are not 4k but 16k long. He also noticed that the x co-ordinate for plotting figure 2d should have been −0.7228 and not positive as shown. Arithmetic apologies all around.



The full Mandelbrot set showing infinite detail



Screen plot from the missing listing 1

```
 10 REM Turbulence
 20 REM by David Johnson-Davies
 30 REM for BBC B/B+/M/E
 40 REM (c) Acorn User June 1986
 50 :
 60 MODE 2
 70 S%=255
 80 line%=5:point%=69
 90 VDU 28,16,31,19,0
100 INPUT "x,s:" j,q
110 Q%=1024:M%=256
120 i=q/M%:I%=Q%/M%
130 style%=point%
140 FOR J%=0 TO M%-1
150 PROCplot
160 style%=line%
170 NEXT
180 END
190 :
200 DEF FNt(u)
210 N%=-1:x=0
220 REPEAT x=x-x*x+u:N%=N%+1
230 UNTIL N%=S% OR ABS(x)>100
240 =N%
250 :
260 DEF PROCplot
270 x=j+i*J%:Y%=FNt(x)*I%
280 X%=J%*I%:PLOT style%,X%,Y%
290 ENDPROC
```

Listing 1. The first of the Mandelbrot set programs, omitted from the May issue

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In addition to the time saving operations performed by this module you can also obtain valuable management information such as debtor lists, which can be printed together with telephone numbers. It is also possible to query any particular account and obtain an up to date picture of the position.

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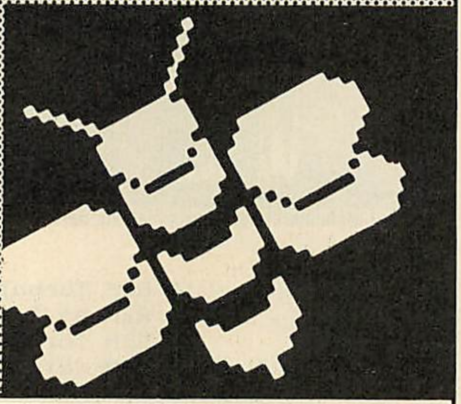
The stock control module is used in conjunction with the invoice program and is updated whenever an invoice is issued. It is then possible to automatically search the stock file for out of stock or re-order level items. Purchase orders can then be printed, automatically if required.

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just eight colours, or with eight colours and eight shades using the Acornsoft *Graphics Extension ROM* to give an additional eight shades consisting of mixtures of successive pairs of the eight standard colours. The version of PROCgcol in lines 540-550 should be used for an eight-colour plot; for 16 colours these two lines should be deleted so that the version of PROCgcol on lines 570-620 is used instead. This version works by setting D% and E% to the values of adjacent logical colours for odd values of B%, and to the same logical colour for even values of B%. The VDU statement in line 600 then sets up a shading pattern, which the GCOL statement in line 610 selects for subsequent plotting.

In the eight-colour version the physical colours are assigned as follows to bring out the detail in the most interesting part of the curves:

black	cyan	green	yellow
0	2	4	6
red	magenta	blue	white
8	10	12	14

Contours for one root

Another interesting possibility is to plot the contours only for those points that lead to a given root, such as the root x=1; this is achieved by altering line 430 to:

```
430 IF x>0 =N% ELSE =0
```

and some resulting plots are shown in figure 6. Figure 6c shows exactly the same region as figure 1b.

The co-ordinates for all the figures shown in this article are given in table 1.

As always, you are advised to save screen-dumps of every successful plot for future reference, using, for example, the command:

```
*SAVE PX FFFF3000 +5000
```

which can be typed in once the program has finished running.

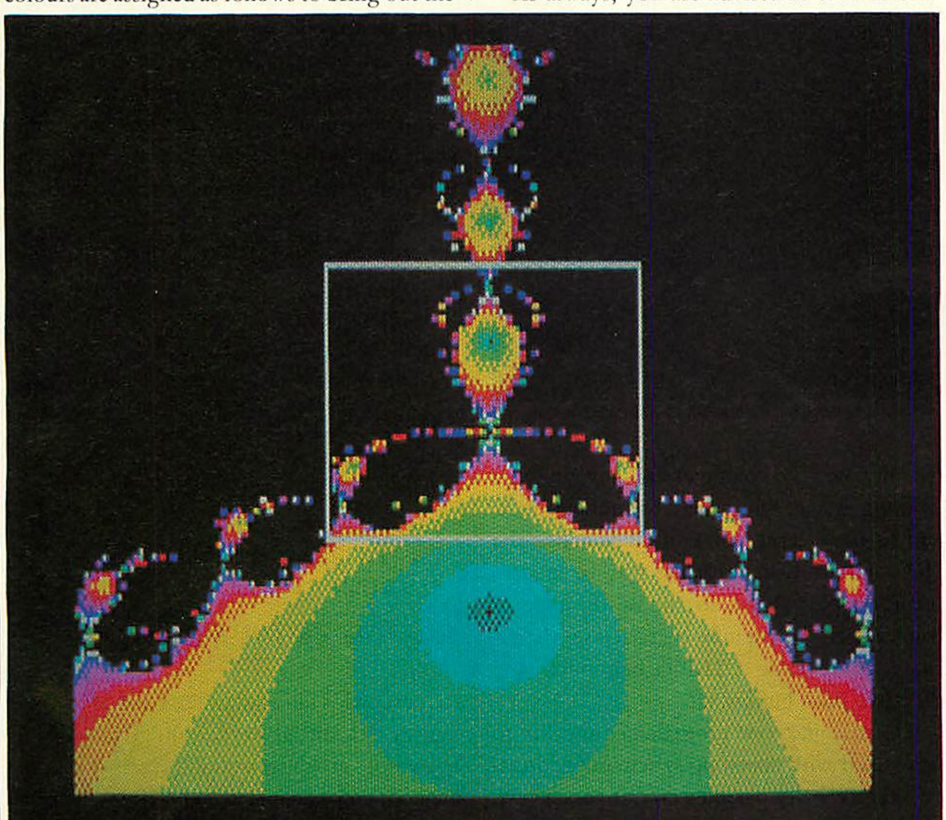
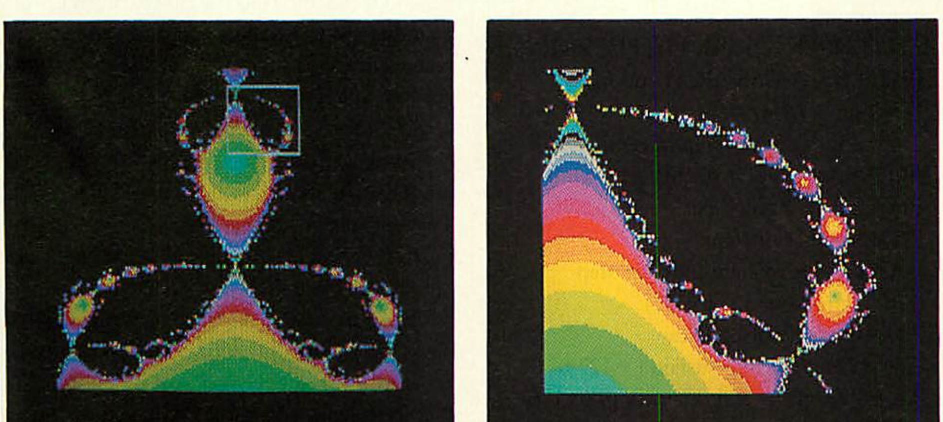


Figure 6. Limiting listing 1 to produce a given root such as x=1 leads to plots such as these three screenshots. Again they are in sequence with each one giving more detail than the last, as you can see . . .



. . . from the squares marked on the first two pictures, which indicate the areas covered by the next screens. This shows the infinite complexity of the patterns created by the programs

Further exploration

This article really only scratches the surface of a fascinating area, which can be explored with the help of a BBC micro and programs such as those presented here. The following ideas should act as profitable starting points for further investigation:

- Does $z^2 = -1$, which has two complex roots, show the same behaviour?
- What about higher-order equations, such as $z^4=1$ or $z^5=1$?
- What happens if, in figure 6, each contour is coloured in two different shades, depending on whether the final estimate of the root is above or below the real (or x) axis?
- Finally, try the effect on the plots of introducing a parameter m into the Newton-Raphson equation, so that it becomes:

$$k = j - \frac{mp(x)}{p'(x)}$$

Figure	x	y	s
1a	−1.5	−1.5	3
1b	−0.825	−0.025	0.3
1c	−0.6385	0.235	0.025
1d	−0.6324	0.2559	0.002
3	−1.5	−1.5	3
4a	−2	−2	4
4b	−0.9	−0.75	1.5
4c	−0.825	−0.025	0.3

Table 1. This shows all the co-ordinates used by the programs in this article

References

This article follows on from 'Join the Mandelbrot Set' in *Acorn User*, May. A good introduction to complex numbers is given in Chapter 15 of *Mathematician's Delight* by W W Sawyer, published by Pelican books. The mathematics behind the use of the Newton-Raphson method for finding complex roots was explored in *Cayley's Problem and Julia Sets* by H O Peitgen, D Saupe and F v Haeseler, in *The Mathematical Intelligencer* Vol. 6, No. 2, 1984. Finally, for a full catalogue of other fractal curves see *The Fractal Geometry of Nature* by Benoit B Mandelbrot, published by W H Freeman & Co.

For David Johnson-Davies' listings see yellow pages index on page 113

GET BY WITH A LITTLE HELP

Find the syntax of commands at the touch of a key by using our programs to build up a help facility – no more wasting time searching through the user guide

Barry Ambrose

Most large computer systems have a help facility. When invoked this gives the user a list of the available commands, possibly with details of their syntax and a few examples of their usage. Indeed the BBC micro has a limited help facility which gives details of the ROMs installed. Typing *HELP should tell you what disc filing system (DFS) ROM you have and the version number of the operating system. Further information is available on the individual DFS commands and their syntax. The programs given here supplement this with the aid of a disc file of help information.

BBC Basic is an advanced implementation of the language. This has a number of advantages. It is possible to program in a structured fashion using procedures, functions and repeat loops, and avoiding the use of GOTOs. The graphics facilities on the Beeb leave the user spoilt for choice: it is straightforward to draw graphs or charts, or fill screen areas; the user has control over background and foreground colours, plotting methods, logical colours, screen windows and origin, and even screen resolution. This wide range may provide problems for the new user trying to memorise the host of commands. For example, even the most dedicated programmer would have difficulty in identifying all 31 teletext control codes correctly. This can be a major drawback in using the full capabilities of the Beeb.

Sound is also well-served. Here you have the ability to play any note of the scale, to define envelopes and produce white noise.

While power like this means that the Beeb can produce a wide variety of tunes or sound effects, the number of sound and envelope parameters required discourages the average programmer.

Matters only get worse when you consider the operating system. This serves as an interface between the computer and any language or filing system which may be running on it, and so has a large range of commands. The *FX commands in particular may be used to set key repeat speed, to choose the type of printer used, to explode character set definitions, to redefine CTRL-G/Bell pitch and duration, flush buffers, etc.



***H lists keywords information is available about**

The machine code programmer also has to be familiar with operating system call addresses, vectors, entry parameters, exit parameters, filing system calls and RAM memory map. All is not lost, however, help is at hand!

The number of Basic commands available to deal with sound, graphics and structured programming is the problem. The operating system commands and machine code calls only add to the complexity. The net result of this, to the programmer, is the need to refer frequently to a much-battered user guide. However, with these new programs presented on the yellow pages, the syntax of commands can be found with the touch of a few keys. See the boxes for two examples illustrating the basic idea. Typing in *H on its own will give a list of keywords on which help information is available. To implement help on the BBC micro you need three programs.

> ***H ENVELOPE**
> The Envelope command takes 14 arguments:
> ENVELOPE N,T,PI1, PI2, PI3, PN1, PN2, PN3, AA,AS,AR,ALA,ALD
> N = Number 1-4
> T = Length of each step in centiseconds (Bit 7 = Auto-repeat pitch)
> PI = Change in pitch per step
> PN = Number of steps
> AA = Change in amplitude per step during attack (−127 to 127)
> AD = Change during decay
> AS = Change during sustain (−127 to 0)
> ALA = Target at end of attack (0 to 126)
> ALD = Target at end of decay (0 to 126)

Details of the *H ENVELOPE command

> ***H KEYSPEED**
> Use *FX11,n to set keyboard auto-repeat delay
> n in centiseconds, 32 is default, 0 to disable
> Use *FX12,n to set auto-repeat rate
> 8 is default, 0 to reset

Details of the *H KEYSPEED command

Create (listing 1) is a short Basic program which creates the help file called H.DATA on your disc. At this stage you have to decide how much storage to allocate to the file, from 2k to 90k. A 20k Help file should be more than sufficient for most people.

Listing 2, Add, gives a Basic program which produces the machine code *ADD command. Type in the Basic program and save it as 'ADDBAS'. When run it should create a file called ADD on your disc. You can now add information to the initially empty H.DATA file. To add information, type *ADD keyword, where keyword may be up to eight characters long and is the command you wish to document. You will be prompted to type in the help entry for that command. Type as many

lines as necessary and press function key f1 when finished. For example, try *ADD ENVELOPE and type in the entry given above.

H is a machine code program created by the Basic program given in listing 3. Save the Basic program as HBAS, and run it. It should create a program called 'H' on your disc. To get a list of help keywords, type *H on its own. To get more information about any keyword, type *H keyword (eg, *H ENVELOPE) and the information will be displayed. After carrying out all the above steps, the files 'H.DATA', 'ADD', and 'H' are the only ones you need to keep.

Thus the sequence of operations is:

- Use CREATE to create a H.DATA file. This has to be done once only.
- Use *ADD to add help entries.
- Use *H at any time to look up an entry.

You can have as many entries as you like, subject to space limitations. Note that the help programs are not suitable for a cassette-based system as they rely on the random access capability of the disc drive to store and recover the help information.

The format of the help file is shown in table 1. Those who have a disc sector editor may wish to change the information stored in it. Five pointers exist at the start of the file pointing to (1) start of keywords; (2) end of keywords; (3) start of help entries; (4) end of help entries; (5) end of file.

Each pointer is four bytes long, stored low byte first. The keywords are stored as eight upper-case characters and padded with spaces, followed by a pointer to the position of the associated entry and two bytes giving the length of the entry. (The easiest way to delete a help entry is to use a disc sector editor to change the keyword to eight 00s – null characters. However, this will not reclaim the disc space used by the entry.) The entries are stored continuously in the file.

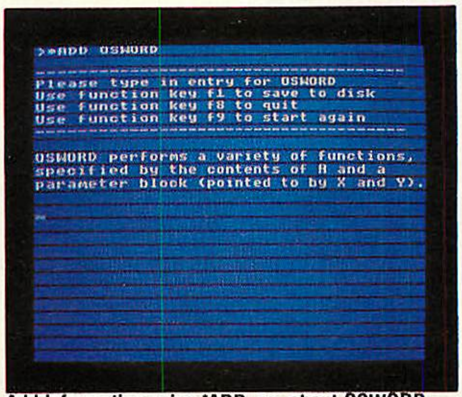
Offset in file	Contents
0	Pointer to start of keywords (usually = &14)
4	Pointer to end of keywords
8	Pointer to start of help entries (usually = L × 0.2)
&C	Pointer to end of help entries
&10	Pointer to end of file (usually = L)
&14	'KEYWORD 1' eight characters
&1C	Pointer to entry 1
&20	Length of entry 1
&22	'KEYWORD 2' eight characters
: :	: : : :
L × 0.2	Text of entry 1
: :	Text of entry 2
	<End of File>

L = *Length of file*

Table 1. Format of the help file

The choice of the format of the file was not straightforward. Open-ended files of keywords and help entries were first tried. However, as more programs were put on the disc, attempts to extend the files produced 'Can't extend' error messages. This was due to the location of the programs straight after the files on the disc, providing little room for the files to extend. To avoid this, fixed length files were created using the *SAVE command to save a block of memory. Inside the files a pointer was used to keep track of the end of the data.

Rather than have two files, one for keywords and one for the help information, the two files were combined into one by the introduction of a few more pointers to result in the format given above.



Add information using *ADD, eg, about OSWORD

The Add and Help programs are written in machine code. Their operation is simple and should be easily understood with the aid of the notes given below. The subroutines have been written to be fairly general and may be adapted by readers for use in their own programs. The random access is accomplished by using OSARGS with A = 1. This takes as parameter a four-byte integer stored in zero page, equivalent to PTR # in Basic.

The GSINIT and GSREAD operating system routines used in these programs are not documented in the user guide but are described in the *Advanced User Guide* by Bray, Dickens and Holmes. They are used to parse the words in a line of text stored in memory, which in this case is the '*ADD keyword' command. GSINIT will skip leading spaces, setting the Z-flag if no word is found. GSREAD will read a character, setting the carry flag if the end of the line has been reached. The address of the line is stored in zero-page locations &F2(LO),&F3(HI). If carry is set when GSINIT is called, then CR(&0D) is the line terminator otherwise the line terminator is either a space(&20) or CR(&0D). The routines also deal correctly with quotation marks and control characters, although these are not likely to occur in Help and Add.

The Help file is not restricted to storing information about Basic commands, it can store information about any aspect of the BBC micro. This might include other languages or documentation about various programs – when written, how to run, the input data required and the overall purpose of the program. At the other extreme it could be used to assist in studying history or geography. The keyword in this case would be a date or a city and the entry would be the information associated with it (eg, *H 1066 – Battle of Hastings).

Possible extensions to the Help facility would be an option to edit or delete Help entries or perhaps to place the Help file and its routines in sideways RAM. The reader should have enough information to tackle these problems and extend 'HELP' as much as he or she desires. However, the routines described here provide the basis for a much needed utility, essential to any serious Basic programmer.

So, you can see how this Help file can replace the user guide. What the working programmer needs is the syntax of relevant commands and notes on any tricky points. Having this information increases both the profitability and pleasure of programming.

The Add program adds a keyword plus associated data to the file H.DATA. It is located at &5000, and the input buffer is at &5600.

chkscrn Checks for mode of screen. If not 6 or 7 then changes screen to mode 6.

chkparms Uses operating system routines OSARGS, GSINIT, GSREAD to read the command line to find a keyword. Converts the keyword to upper-case and pads it with spaces, if present, otherwise returns with carry set.

explain Explains to the user the syntax of the ADD command.

instruct Tells the user which function keys are used to save, quit or start again.

keyon Gives the function keys ASCII codes from &80 onwards.

keysoff Returns function keys to normal.

readbyte Reads a byte from the file.

putbyte Stores a byte in the file.

close Closes the file.

The Help program displays a list of keywords or displays information about a particular keyword, and is located at &900.

open Uses OSFIND with A = &40 to open the H.DATA file for input, then retrieves the pointers from the start of the file.

close, readbyte, chkparms Work as in Add.

How the Add and Help programs work

For Barry Ambrose's listings, see the yellow pages index on page 113

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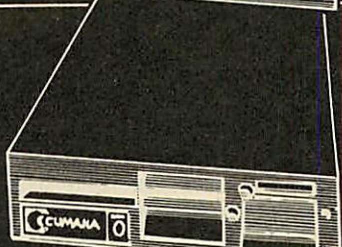
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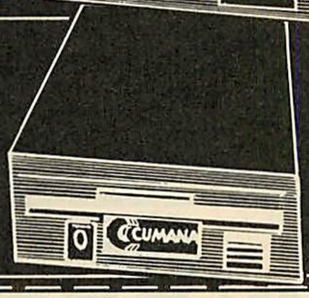
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AA212

COMPETITION

NUMBER CRUNCHING IN THE DUNGEON

Mad Alex, dwarves and trolls lead you through the Acorn User dungeon to a Viglen Winchester hard disc drive

Simon Dally

In the *Acorn User* dungeon, as regular readers will know, there are two kinds of inhabitants. There are the dwarfs, who *always* tell the truth, and the trolls, who *always* lie.

As usual, before entering into this treacherous domain, you are given a series of problems to solve – this month the dungeon theme is large numbers. You must solve all three problems, add the solutions together, enter the dungeon and work through the rooms.

In each room you must decide which (if any) of the characters is a dwarf and do exactly as that character tells you. You should ignore any message a troll gives you. Of course, a room may contain more than one dwarf, in which case you follow the instructions in the order you receive them; if you cannot determine whether a character speaking to you is a dwarf or a troll then you must ignore that advice also.

As usual, Mad Alex is your guide, his gold earring programmed to keep the spiders at bay and spare you embarrassment.

To be technical for a moment, all numbers in this competition are positive integers in base 10. There are no negative or decimal numbers.

The three problems are as follows:

1 What is the smallest number ending in 4 which is doubled when its final digit is moved from last position to first?

2 Three times the seventh power of the four-digit part of Mad Alex's phone number is exactly seven times the cube of a NASA mainframe's seven-digit phone number Mad Alex wishes to hack. What is the phone number of the mainframe?

3 Find an eight-digit number which is one third of what you get by adding the square of the first four digits with the square of the second four.

Well, no doubt that was dead easy for you, and you've now added the numbers together. Into the dungeon you go . . .

Room 1. A: If I'm a dwarf, so is B. Add the solution to Problem One to your number.

B: I'm a dwarf! Add the solution to Problem One to your number.



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Room 2. A: If B is a dwarf then I must be a troll. Add the solution to Problem Three to your number.

B: I'm a dwarf, promise guv! You must subtract the solution to Problem One from your number.

Room 3. A: I promise you I'm a dwarf. So is B. Add the solution to Problem Three to your number.

B: Well, if A is a dwarf so is C. Add the solution to Problem Two to your number.

C: Hey! I'm a dwarf too! Add the solution to Problem Three to your number.

Mad Alex now disappears (with a great deal of noise) in a clap of thunder leaving you to write out your answer and send it in on a postcard to July Competition, *Acorn User*, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF. Answers to arrive not later than July 15.

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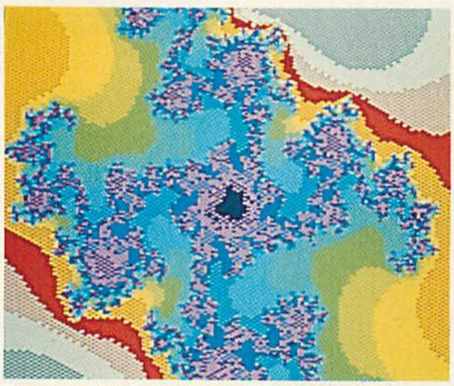
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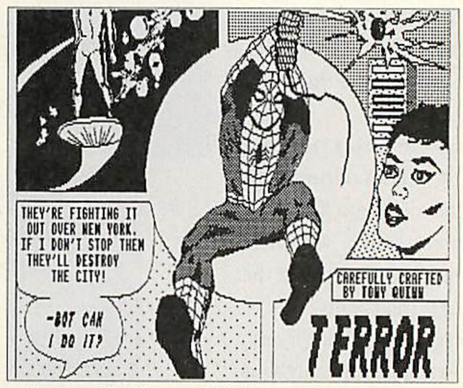
The number is

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Plus there's an added bonus – each month the discs contain screens featured in the magazine which are not included on the monthly listings cassettes, so you get even more for your money!

You can see some of these graphics screens pictured above. The discs are supplied in 5.25in 40-track format, and conversion instructions are included for 80-track disc users.

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HA12

USERRAM

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So easy to fit

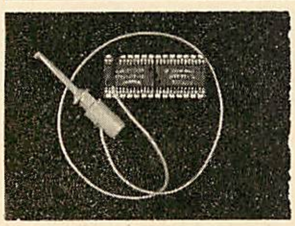
- Switch off BBC micro. Remove lid and keyboard to reveal sideways ROM sockets.
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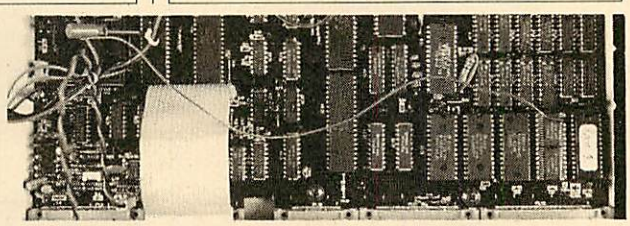
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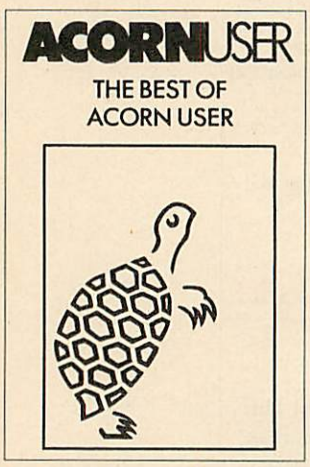
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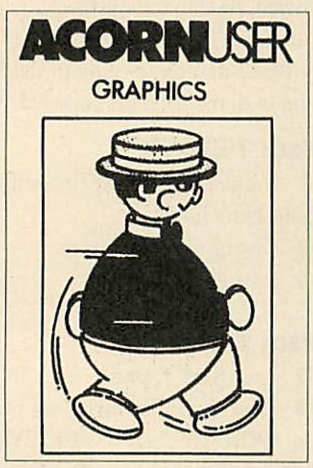
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ACORN USER GRAPHICS CASSETTE



This Spiderman screen was created using Paintbox

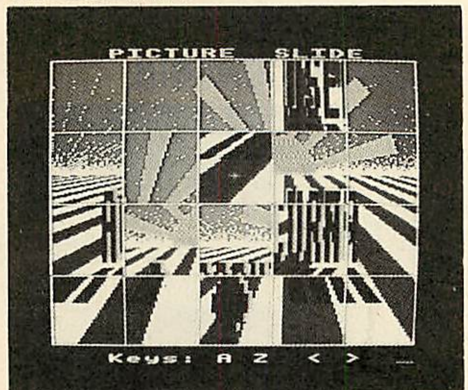
Four of the most popular and useful graphics programs that we've presented in *Acorn User* – Rob Fenton's *Paintbox*, Peter Sandford's *Colfill* and *Dotfill* and Harry Sinclair's Sprite designer – are now available on one cassette, suitable for use with the BBC micro or Electron, competitively priced at £3.95.

Paintbox, (February 1985), offers you a wide palette of facilities – airbrushing, drawing circles and squares, colour filling, colour mixing and textured effects – and it's fast!

Peter Sandford's *Dotfill* and *Colfill* (January and February 1985) allow you to produce bar charts, pie charts, maps, etc, with up to 28 coloured fill patterns and 24 tone patterns, and to mix foreground and background colours.

Harry Sinclair's Sprite designer from the September, October and November 1984 issues of *Acorn User* lets you design full-colour cartoon figures quickly, then edit, clone or mirror them and move them around the screen.

BEST OF ACORN USER CASSETTE



Picture Slide from the Best of Acorn User

The second cassette to be introduced in our developing range of special cassettes, *The Best of Acorn User*, contains a comprehensive selection of 11 program listings from past issues, which you will find entertaining and useful.

It features Malcolm Banthorpe's Turtle Graphics program, an easy introduction to Logo; an all screen mode printer dump for Epson and Epson-compatible printers; a bad program recovery routine for those times when it seems all is lost; a selection of sideways RAM utilities to help you make the most of your discs and ROMs, and two games to keep you amused, *Picture Slide* and *Quadline*.

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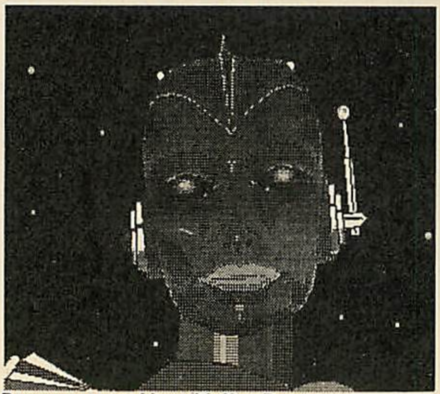
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UserDump and UserROM only £19.95 each

ACORN USER PRINTER CONTROL



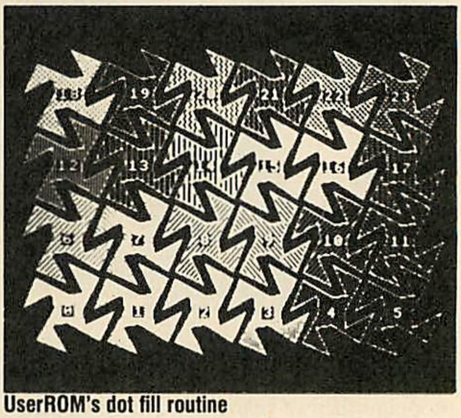
Dump your graphics with UserDump

UserDump includes a ROM chip which plugs into any free ROM socket on your BBC micro, and an easy-to-use manual. With *UserDump* you'll have a wide range of commands to help you control your printer's facilities. You will be able to dump any screen image in any display mode by entering a single command – either as a line of your program or direct from the keyboard.

UserDump will work with all popular dot-matrix printers including most Epson compatible printers and all printers with single and double density bit image graphics.

UserDump provides extra commands including: whole screen, graphics window and text window dumps, fast screen dump, definition of a graphics window plus many more.

ACORN USER ON A CHIP



UserROM's dot fill routine

The *Acorn User UserROM* brings the best of *Acorn User* into your micro. Put together by our technical editor, Bruce Smith, this 8k ROM chip is packed with your favourite *Acorn User* routines. Simply plug the ROM chip into a spare sideways ROM socket and all the routines are instantly accessible via easy to use * commands – what could be simpler!

Routines include the popular colour fill and dot fill routines, bad program recovery, variable lister, function key lister, a graphics compiler, a circle drawing routine, a bulletin board, screen compressor, on screen character fonts, ROM lister, sound compiler, plus lots, lots more!

A 22-page manual comes with *UserROM* and includes many demonstration programs.

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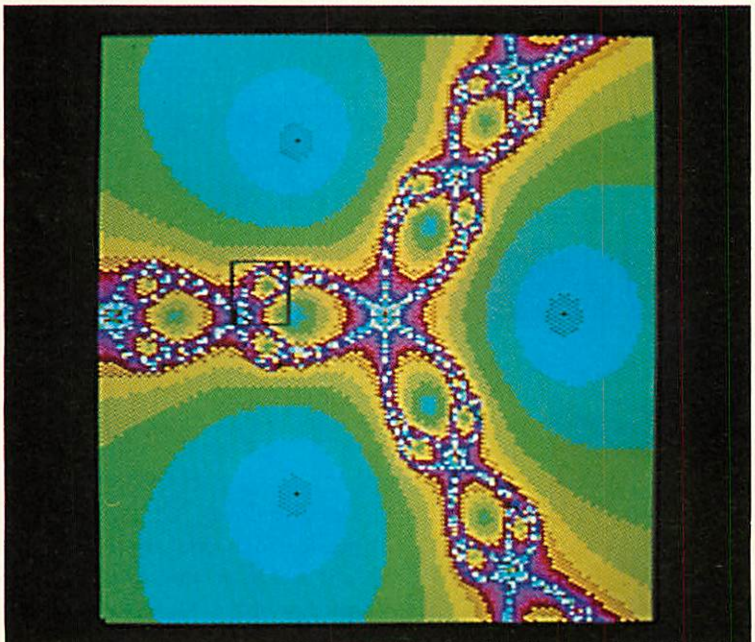
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LISTINGS

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July listings on cassette £3.75 or disc £5.75



This screen plotting complex roots is part of the graphics bonus on the listings disc

July's program listings cassette, priced £3.75, features Joe Telford's wordsearch programs, which provide hours of fun as you create and solve your own wordsearch puzzles. On the graphics side we have David Johnson-Davies' programs for finding complex roots, producing spectacular colour displays like the one shown above.

Also featured are Barry Ambrose's help-disc software and a handy text-spooler for the *View* family. Among the Hints & Tips are a useful vertical text routine and a demonstration of polar graphics.

The disc version of July's listings costs £5.75 and, as always, includes a graphic bonus. This month it's a selection of David Johnson-Davies' complex-root screens. The disc also features our easy-to-use index.

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YELLOW PAGES

INDEX/COMPATIBILITY

INDEX

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Hints & Tips	Listing 1	113	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
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Joe's Jottings	Listings 1 & 2	115	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
Complex Roots	Listings 1 & 2	122	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
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1770 Osword Demo	Listing 1	127	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y(a)
View Spooler	Listing 1	128	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(b)
	Listing 2	128	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(c)

(a) 1770 disc controller + DFS/ADFS required

(b) View *required*

(c) View + ViewSheet/ViewStore *required*

See Hints and Tips, page 51 (NB: Width = 24 for this listing)

Listing 1. J A Law's vertical printing routine

```
   10 REM Hints & Tips -
listing 1
   20 REM Vertical print
   30 REM by J A Law
   40 REM BBC B/B+/M/E
   50 REM (c) Acorn User
July 1986
   60 :
   70 PROCassemble
   80 PROCchecksum
   90 MODE 4
  100 PROCtest
  110 END
  120 :
  130 DEF PROCtest
  140 PRINTTAB(10,20);
  150 *LINE Demo
  160 PRINT"  of vertica
l printing."
  170 ENDPROC
  180 :
  190 DEF PROCassemble
  200 wrch=&FFEE:osword=
&FFF1
  210 userv=&200
  220 FOR opt%=0 TO 2 ST
EP 2
  230 P%=&900
  240 [OPT opt%
  250 .sideways
  260 CMP #1:BEQ code
  270 BRK
  280 ]
  290 ?P%=255:P%=P%+1
  300 $P%="Bad command"
  310 P%=P%+LEN$P%
```

Continued ▶

◀ Continued

```
  320 [OPT opt%
  330 BRK
  340 .code
  350 STX &70:STY &71
  360 LDA #0:TAY:TAX
  370 STA &72
  380 .clear
  390 STA &88,X
  400 INX:CPX #8
  410 BNE clear
  420 .getchar
  430 LDY &72
  440 LDA (&70),Y
  450 CMP #32:BEQ space
  460 CMP #13:BEQ end
  470 STA &7F
  480 LDA #&0A
  490 LDX #&7F:LDY #0
  500 JSR osword
  510 LDX #0:LDY #0
  520 .loop1
  530 CLC
  540 LDA &80,Y:ROL A
  550 STA &80,Y
  560 LDA &88,X:ROL A
  570 STA &88,X
  580 INX:CPX #8
  590 BNE loop1
  600 LDX #0
  610 INY:CPY #8
  620 BNE loop1
  630 LDX #0
  640 .loop2
  650 LDA &88,X
  660 PHA
  670 INX:CPX #8
```

Continued ▶

◀ Continued

```
  680 BNE loop2
  690 LDX #0
  700 .loop3
  710 LDA #23:JSR wrch
  720 LDA #224:JSR wrch
  730 .loop4
  740 PLA:JSR wrch
  750 INX:CPX #8
  760 BNE loop4
  770 LDA #224:JSR wrch
  780 .cursor
  790 LDA #8:JSR wrch
  800 LDA #11:JSR wrch
  810 INC &72
  820 JMP getchar
  830 .space
  840 LDA #32:JSR wrch
  850 JMP cursor
  860 .end
  870 RTS
  880 ]NEXT opt%
  890 :
  900 ?userv=sideways MO
D 256
  910 ?(userv+1)=sideway
s DIV 256
  920 ENDPROC
  930 :
  940 DEF PROCchecksum
  950 t%=0
  960 FOR byte%=&900 TO
P%-1
  970 t%=t%+?byte%
  980 NEXT
  990 IF t%<>19468 THEN
PRINT"Checksum error; ch
eck typing":END
 1000 ENDPROC
```

See First Byte, page 57

Listing 1. Creates a large file from many small ones

```
   10 REM First Byte - listing 1
   20 REM Program combiner
   30 REM David Acton/Tessie Revivis
   40 REM for BBC B/B+/M/E with discs
   50 REM (c) Acorn User July 1986
   60 :
   70 lim%=7000
   80 ON ERROR MODE6:CLOSE#0:REPORT:PRIN
T" at line ";ERL:END
   90 MODE 1
  100 VDU 23,1;0;0;0;0;19,2,4;0;
  110 PROCw(5,3,34,1,3,2)
  120 PROCc(2,"Program Combiner")
  130 READ core$
  140 numout%=1
  150 PROCopenout
  160 REPEAT
  170 READ prog$
  180 IF prog$="LAST" GOTO 360
  190 in%=OPENIN(prog$)
  200 ext%=EXT#in%
  210 IF len%+ext%>lim% PROCclose:PROCop
enout
  220 len%=len%+ext%
  230 PROCw(5,17,34,15,0,3)
  240 PROCc(16,"Writing "+prog$+" to "+S
TR$(numout%-1))
  250 FOR c%=1 TO LEN(prog$)
  260 BPUT#out%,ASCMID$(prog$,c%)
  270 NEXT
  280 BPUT#out%,13
  290 BPUT#out%,ext% MOD 256
  300 BPUT#out%,ext% DIV 256
  310 FOR byte%=1 TO ext%
  320 k%=BGET#in%
  330 BPUT#out%,k%
  340 NEXT
  350 CLOSE#in%
  360 UNTIL prog$="LAST"
  370 PROCclose
  380 PROCw(5,18,34,15,0,1)
  390 PROCc(16,"Process complete-")
  400 PROCc(17,"press any key")
  410 any=GET
  420 MODE 6:END
  430 :
  440 DEF PROCopenout
  450 out%=OPENOUT(core$+STR$numout%)
  460 numout%=numout%+1
  470 len%=0
  480 ENDPROC
  490 :
  500 DEF PROCclose
  510 FOR c%=1 TO 4
  520 BPUT#out%,ASCMID$("exit",c%)
  530 NEXT
  540 BPUT#out%,13
  550 CLOSE#out%
  560 ENDPROC
  570 :
  580 REM Sample data
  590 :
  600 DATA "CORE"
  610 DATA "PROG1"
  620 DATA "PROG2"
  630 DATA "PROG3"
  640 DATA "PROG4"
  650 DATA "PROG5"
```

Continued ▶

◀ Continued

```
  660 DATA "LAST"
  670 :
  680 DEF PROCc(y,t$)
  690 VDU 26,31,20-LENt$/2,y
  700 PRINT t$
  710 ENDPROC
  720 :
  730 DEF PROCw(l,d,r,u,p,q)
  740 VDU 24,l*32-16;(31-d)*32-16;(r+1)*
32-16;(32-u)*32-16;
  750 GCOL 0,131:CLG
  760 VDU 24,l*32-12;(31-d)*32-12;(r+1)*
32-20;(32-u)*32-20;
  770 GCOL 0,128:CLG
  780 COLOUR p:COLOUR 128+q
  790 VDU 28,l,d,r,u,12
  800 ENDPROC
```

Listing 2. Expands the combined file into the original programs

```
   10 REM First Byte - listing 2
   20 REM Program loader/copier
   30 REM David Acton/Tessie Revivis
   40 REM for BBC B/B+/M/E with discs
   50 REM (c) Acorn User July 1986
   60 :
   70 MODE 4
   80 VDU 23,1;0;0;0;0;
   90 DIM m% 7200
  100 DIM oscli% 80
  110 READ title$,core$,corenum%
  120 PROCw(1,3,38,1,0,3)
  130 PROCc(2,title$)
  140 PROCw(1,29,38,7,0,3)
  150 PROCc(2,"Your listings from "+titl
e$)
  160 PROCc(4,"are stored as a single da
ta block.")
  170 PROCc(7,"To use the listings, they
 must be")
  180 PROCc(9,"copied to a blank, format
ted disc.")
  190 PROCc(17,"Press C to begin copying
 process")
  200 PROCc(19,"Press A to abort process
     ")
  210 choice%=FNgetkey(" CcAa")
  220 IF choice%=2 PROCend
  230 CLS
  240 PROCc(8,"Press D if you have dual
disc drives")
  250 PROCc(10,"Press S if you have a si
ngle drive")
  260 drvs%=FNgetkey(" SsDd")
  270 FOR h%=1 TO corenum%:CLS
  280 IF h%>1 AND drvs%=1 PROCreinsert
  290 IF h%=1 PROCc(9,"Ensure that the c
ombined listings"):PROCc(11,"disc is loc
ated in drive 0."):PROCany
  300 CLS
  310 PROCc(10,"Loading data...")
  320 PROCoscli("LOAD "+core$+STR$h%+" "
+STR$~m%)
  330 CLS
  340 ON ERROR CLOSE#0:PROCreinsert:PROC
end
  350 IF drvs%=1 PROCsingle ELSE IF h%=1
 PROCdouble
```

Continued ▶

◀ Continued

```
360 pt%=m%
370 REPEAT n$=""
380 REPEAT n$=n$+CHR$(?pt%)
390 pt%=pt%+1:UNTIL ?pt%=13:pt%=pt%+1
400 IF n$="exit" GOTO 490
410 CLS
420 PROCc(10,"Saving program "+n$)
430 L%=?pt%+256*pt%?1:pt%=pt%+2
440 IF drvs%=1 out%=OPENOUT(n$) ELSE o
ut%=OPENOUT(":1."+n$)
450 FOR B%=0 TO L%-1
460 BPUT#out%,B%?pt%
470 NEXT
480 CLOSE#out%:pt%=pt%+L%
490 UNTIL n$="exit"
500 NEXT
510 CLS:PROCok:PROCend
520 :
530 DEF PROCend
540 VDU 26,20,12
550 END
560 :
570 DEF PROCc(y,t$)
580 VDU 31,19-LENt$/2,y
590 PRINT t$
600 ENDPROC
610 :
620 DEF PROCw(l,d,r,u,p,q)
630 VDU 24,l*32-16;(31-d)*32-16;(r+1)*
32-16;(32-u)*32-16;
640 GCOL 0,131:CLG
650 VDU 24,l*32-12;(31-d)*32-12;(r+1)*
32-20;(32-u)*32-20;
660 GCOL 0,128:CLG
670 COLOUR p:COLOUR 128+q
680 VDU 28,l,d,r,u,12
690 ENDPROC
700 :
710 DEF PROCany
720 PROCc(VPOS+4,"Press any key to con
tinue...")
730 *FX 15,1
740 any=GET
750 ENDPROC
760 :
770 DEF FNgetkey(s$)
780 REPEAT k%=INSTR(s$,GET$) DIV 2
790 UNTIL k%
800 =k%
810 :
820 DEF PROCoscli($oscli%)
830 X%=oscli%:Y%=oscli% DIV 256
840 CALL &FFF7
850 ENDPROC
860 :
870 DEF PROCsingle
880 CLS
890 PROCc(6,"Remove the combined listi
ngs disc")
900 PROCc(8,"from drive 0 and insert y
our")
910 PROCc(10,"blank, formatted disc.")
920 PROCany
930 ENDPROC
940 :
950 DEF PROCdouble
960 CLS
970 PROCc(9,"Insert your blank, format
ted")
980 PROCc(11,"disc in drive 1.")
```

Continued ▶

◀ Continued

```
990 PROCany
1000 ENDPROC
1010 :
1020 DEF PROCok
1030 PROCc(6,"Process complete:")
1040 PROCc(8,"Your disc now contains al
l of the")
1050 PROCc(10,"required listings.")
1060 PROCany
1070 ENDPROC
1080 :
1090 DEF PROCreinsert:IF drvs%=2 ENDPRO
C
1100 CLS
1110 PROCc(6,"Remove destination disc a
nd insert")
1120 PROCc(8,"the combined listings dis
c in")
1130 PROCc(10,"the disc drive.")
1140 PROCany
1150 ENDPROC
1160 :
1170 REM Refer to  article for details
1180 :
1190 DATA "Demo","CORE",1
```

See Letter Box Puzzles, page 81

Listing 1. Allows you to solve wordsearch puzzles

```
10 REM Wordsearch Solver
20 REM by Joe Telford
30 REM for BBC B/B+/M
40 REM (c) Acorn User July 1986
50 :
60 CLOSE#0
70 MODE 7
80 DIM line$(30),word$(80),g$(30,30),
oscar% 256
90 lines%=0:words%=0:width%=0
100 lettergrid$="Blank"
110 wordlist$="Blank"
120 PROCtitle
130 ON ERROR PROCerr
140 REPEAT
150 choice=FNmenu
160 IF choice=1 PROCenterarray
170 IF choice=2 PROCsavearray
180 IF choice=3 PROCenterwords
190 IF choice=4 PROCsavewords
200 IF choice=5 PROCfindletters
210 IF choice=6 PROCfindword
220 IF choice=7 PROCfindall
230 IF choice=8 PROCblank
240 IF choice=9 PROCpreview(3,1)
250 IF choice=10 PROCpreview(2,1)
260 IF choice=11 PROCgridview(3,1)
270 IF choice=12 PROCgridview(2,1)
280 IF choice=13 PROCwrdview(3,1)
290 IF choice=14 PROCwrdview(2,1)
300 UNTIL choice=15
310 CLS
320 PRINT"Done!":END
330 END
340 :
350 DEF PROCoscar($oscar%)
360 X%=oscar% MOD 256
370 Y%=oscar% DIV 256
380 CALL &FFF7
```

Continued ▶

Joe's listing 1 continued

```
  390 ENDPROC
  400 :
  410 DEF PROCerr
  420 VDU 6:CLOSE#0:*SPOOL
  430 IF ERR=17 ENDPROC
  440 REPORT:PRINT" at ";ERL
  450 END
  460 :
  470 DEF PROCfindall
  480 IF width%<1 OR lines%<2 PRINTr$"Ba
d lettergrid!":PROCdelay:ENDPROC
  490 IF words%<1 PRINTr$"Bad wordlist!"
:PROCdelay:ENDPROC
  500 FOR wrd%=1 TO words%
  510 result=FNfind(word$(wrd%))
  520 IF result THEN PROCpreview(3,0):PR
INTg$; ELSE PRINTr$;
  530 PRINTword$(wrd%);:IF NOTresult PRI
NT" not";
  540 PRINT" found."
  550 NEXT
  560 ENDPROC
  570 :
  580 DEF PROCfindword
  590 IF width%<1 OR lines%<2 PRINTr$"Ba
d lettergrid!":PROCdelay:ENDPROC
  600 PRINT'y$"Find word?"w$;:INPUT""wrd
$
  610 IF FNfind(wrd$) THEN PRINTg$;wrd$"
 found ok." ELSE PRINTr$;wrd$" not found
."
  620 *FX 21,0
  630 dummy=INKEY(100)
  640 ENDPROC
  650 :
  660 DEF FNfind(wrd$)
  670 lft$=LEFT$(wrd$,1)
  680 result=FALSE
  690 FOR loop%=1 TO lines%
  700 FOR inloop%=1 TO width%
  710 IF MID$(line$(loop%),inloop%,1)=lf
t$ THEN result=FNcheck2(loop%,inloop%)
  720 IF result THEN loop%=lines%:inloop
%=width%
  730 NEXT:NEXT
  740 =result
  750 :
  760 DEF FNcheck2(L%,W%)
  770 LOCAL result:result=FALSE
  780 IF NOT(result) THEN result=FNcheck
r(L%,W%)
  790 IF NOT(result) THEN result=FNcheck
rd(L%,W%)
  800 IF NOT(result) THEN result=FNcheck
ru(L%,W%)
  810 IF NOT(result) THEN result=FNcheck
l(L%,W%)
  820 IF NOT(result) THEN result=FNcheck
ld(L%,W%)
  830 IF NOT(result) THEN result=FNcheck
lu(L%,W%)
  840 IF NOT(result) THEN result=FNcheck
u(L%,W%)
  850 IF NOT(result) THEN result=FNcheck
d(L%,W%)
  860 =result
  870 :
  880 DEF PROCmap(rd,cd,er,ec)
  890 FOR pool%=LENwrd$ TO 1 STEP-1
  900 er=er-rd:ec=ec-cd
```

Continued ▶

◀ Continued

```
  910 g$(er,ec)=MID$(wrd$,pool%,1)
  920 NEXT
  930 ENDPROC
  940 :
  950 DEF FNcheckd(r%,c%)
  960 IF LENwrd$+r%>lines%+1 THEN =FALSE
  970 FOR ptr%=1 TO LEN(wrd$)
  980 IF MID$(wrd$,ptr%,1)<>MID$(line$(r
%),c%,1) THEN ptr%=LEN(wrd$):NEXT:=FALSE
  990 r%=r%+1:c%=c%+0
 1000 NEXT
 1010 PROCmap(1,0,r%,c%)
 1020 =TRUE
 1030 :
 1040 DEF FNchecku(r%,c%)
 1050 IF r%-LENwrd$<0 THEN =FALSE
 1060 FOR ptr%=1 TO LEN(wrd$)
 1070 IF MID$(wrd$,ptr%,1)<>MID$(line$(r
%),c%,1) THEN ptr%=LEN(wrd$):NEXT:=FALSE
 1080 r%=r%-1:c%=c%+0
 1090 NEXT
 1100 PROCmap(-1,0,r%,c%)
 1110 =TRUE
 1120 :
 1130 DEF FNchecklu(r%,c%)
 1140 IF c%-LENwrd$<0 THEN =FALSE
 1150 IF r%-LENwrd$<0 THEN =FALSE
 1160 FOR ptr%=1 TO LEN(wrd$)
 1170 IF MID$(wrd$,ptr%,1)<>MID$(line$(r
%),c%,1) THEN ptr%=LEN(wrd$):NEXT:=FALSE
 1180 r%=r%-1:c%=c%-1
 1190 NEXT
 1200 PROCmap(-1,-1,r%,c%)
 1210 =TRUE
 1220 :
 1230 DEF FNcheckld(r%,c%)
 1240 IF c%-LENwrd$ <0 THEN =FALSE
 1250 IF LENwrd$+r%>lines%+1 THEN =FALSE
 1260 FOR ptr%=1 TO LEN(wrd$)
 1270 IF MID$(wrd$,ptr%,1)<>MID$(line$(r
%),c%,1) THEN ptr%=LEN(wrd$):NEXT:=FALSE
 1280 r%=r%+1:c%=c%-1
 1290 NEXT
 1300 PROCmap(1,-1,r%,c%)
 1310 =TRUE
 1320 :
 1330 DEF FNcheckl(r%,c%)
 1340 IF c%-LENwrd$<0 THEN =FALSE
 1350 FOR ptr%=1 TO LEN(wrd$)
 1360 IF MID$(wrd$,ptr%,1)<>MID$(line$(r
%),c%,1) THEN ptr%=LEN(wrd$):NEXT:=FALSE
 1370 r%=r%+0:c%=c%-1
 1380 NEXT
 1390 PROCmap(0,-1,r%,c%)
 1400 =TRUE
 1410 :
 1420 DEF FNcheckru(r%,c%)
 1430 IF LENwrd$+c%>width%+1 THEN =FALSE
 1440 IF r%-LENwrd$<0 THEN =FALSE
 1450 FOR ptr%=1 TO LEN(wrd$)
 1460 IF MID$(wrd$,ptr%,1)<>MID$(line$(r
%),c%,1) THEN ptr%=LEN(wrd$):NEXT:=FALSE
 1470 r%=r%-1:c%=c%+1
 1480 NEXT
 1490 PROCmap(-1,1,r%,c%)
 1500 =TRUE
 1510 :
 1520 DEF FNcheckrd(r%,c%)
 1530 IF LENwrd$+c%>width%+1 THEN =FALSE
 1540 IF LENwrd$+r%>lines%+1 THEN =FALSE
```

Continued ▶

◀ Continued

```
1550 FOR ptr%=1 TO LEN(wrd$)
1560 IF MID$(wrd$,ptr%,1)<>MID$(line$(r%),c%,1) THEN ptr%=LEN(wrd$):NEXT:=FALSE
1570 r%=r%+1:c%=c%+1
1580 NEXT
1590 PROCmap(1,1,r%,c%)
1600 =TRUE
1610 :
1620 DEF FNcheckr(r%,c%)
1630 IF LENwrd$+c%>width%+1 THEN =FALSE
1640 FOR ptr%=1 TO LEN(wrd$)
1650 IF MID$(wrd$,ptr%,1)<>MID$(line$(r%),c%,1) THEN ptr%=LEN(wrd$):NEXT:=FALSE
1660 r%=r%+0:c%=c%+1
1670 NEXT
1680 PROCmap(0,1,r%,c%)
1690 =TRUE
1700 :
1710 DEF PROCfindletters
1720 IF width%<1 OR lines%<2 PRINTr$"Bad lettergrid!":PROCdelay:ENDPROC
1730 PRINT'y$"Find letter?"w$;:INPUT""lft$:PRINTTAB(20,VPOS-1);
1740 counter%=0
1750 FOR loop%=1 TO lines%
1760 FOR inloop%=1 TO width%
1770 IF MID$(line$(loop%),inloop%,1)=lft$ THEN counter%=counter%+1:g$(loop%,inloop%)=lft$:PRINTcounter%;" matches.";:PRINTSTRING$(19,CHR$8);
1780 NEXT:NEXT
1790 *FX 21,0
1800 dummy=INKEY(300)
1810 ENDPROC
1820 :
1830 DEF PROCwrdview(p%,d%)
1840 IF words%<1 PRINTr$"Bad wordlist!":PROCdelay:ENDPROC
1850 CLS:VDU p%
1860 IF p%=3 VDU14:PRINTy$"Use SHIFT to scroll."
1870 FOR loop%=1 TO words% STEP 2
1880 PRINTword$(loop%);SPC(20-LEN(word$(loop%)));word$(loop%+1)
1890 NEXT
1900 VDU 3,15:IF d%=0 ENDPROC
1910 PRINT"---Space-Bar---";
1920 REPEAT UNTIL GET=32
1930 ENDPROC
1940 :
1950 DEF PROCgridview(p%,d%)
1960 IF width%<1 OR lines%<2 PRINTr$"Bad lettergrid!":PROCdelay:ENDPROC
1970 CLS:VDU p%
1980 IF p%=3 VDU14:PRINTy$"Use SHIFT to scroll."
1990 FOR loop%=1 TO lines%
2000 FOR inloop%=1 TO LEN(line$(loop%))
2010 PRINTMID$(line$(loop%),inloop%,1);
2020 IF p%=2 VDU1,32
2030 NEXT:PRINT:NEXT
2040 VDU 3,15:IF d%=0 ENDPROC
2050 PRINT"---Space-Bar---";
2060 REPEAT UNTIL GET=32
2070 ENDPROC
2080 :
2090 DEF PROCpreview(p%,d%)
2100 IF width%<1 OR lines%<2 PRINTr$"Bad lettergrid!":PROCdelay:ENDPROC
2110 CLS
```

Continued ▶

◀ Continued

```
2120 VDU p%
2130 FOR loop%=1 TO lines%
2140 FOR inloop%=1 TO width%
2150 PRINTg$(loop%,inloop%);
2160 IF p%=2 VDU1,32
2170 NEXT:PRINT:NEXT
2180 VDU 3:IF d%=0 ENDPROC
2190 PRINT"---Space-Bar---";
2200 REPEAT UNTIL GET=32
2210 ENDPROC
2220 :
2230 DEF PROCblank
2240 IF lines%<1 PRINTr$"Bad lettergrid!":PROCdelay:ENDPROC
2250 PRINTg$"Blanking target grid .......Please wait"
2260 width%=LENline$(1)
2270 FOR loop%=1 TO lines%
2280 FOR inloop%=1 TO width%
2290 g$(loop%,inloop%)="."
2300 NEXT:NEXT
2310 ENDPROC
2320 :
2330 DEF PROCtitle
2340 y$=CHR$131:b$=CHR$132:r$=CHR$129
2350 g$=CHR$130:d$=CHR$141:n$=CHR$157
2360 w$=CHR$135:c$=CHR$134:m$=CHR$133
2370 CLS
2380 PRINTd$y$SPC10"Wordsearch Solver"
2390 PRINTd$y$SPC10"Wordsearch Solver"
2400 PRINTr$n$y$SPC7"(c) Joe Telford 1986"
2410 VDU 28,0,24,39,3
2420 ENDPROC
2430 :
2440 DEF FNmenu
2450 REPEAT:CLS
2460 PRINTm$"Lettergrid:"c$;lettergrid$;
2470 PRINTTAB(20,VPOS);m$"Wordlist:"c$;wordlist$
2480 PRINTc$SPC3"1  ..."y$"Load Letter Grid."
2490 PRINTc$SPC3"2  ..."y$"Save Letter Grid."
2500 PRINTc$SPC3"3  ..."y$"Load Word List."
2510 PRINTc$SPC3"4  ..."y$"Save Word List."
2520 PRINTc$SPC3"5  ..."y$"Find Letter."
2530 PRINTc$SPC3"6  ..."y$"Find Word."
2540 PRINTc$SPC3"7  ..."y$"Solve grid."
2550 PRINTc$SPC3"8  ..."y$"blank target grid."
2560 PRINTc$SPC3"9  ..."y$"Preview target grid."
2570 PRINTc$SPC3"10 ..."y$"Print target grid."
2580 PRINTc$SPC3"11 ..."y$"Preview letter grid."
2590 PRINTc$SPC3"12 ..."y$"Print letter grid."
2600 PRINTc$SPC3"13 ..."y$"Preview word list."
2610 PRINTc$SPC3"14 ..."y$"Print word list."
2620 PRINTc$SPC3"15 ..."y$"Exit Wordsearch."
2630 PRINTy$"Which?"w$;:INPUT""choice
```

Continued ▶

Joe's listing 1 continued

```
2640 UNTIL choice>0 AND choice<16
2650 =choice
2660 :
2670 DEF PROCenterarray
2680 PRINT'y$"Use a Word-grid file (Y/N
)?"w$;
2690 IF NOT FNyes PROCtypearray(0):PROC
blank:ENDPROC
2700 VDU 11:PROCspc
2710 PRINTy$"What is the gridfile's nam
e?"w$;
2720 INPUT""f$
2730 channel=OPENINf$:CLOSE#channel
2740 IF channel=0 PRINTr$"No such file!
":PROCdelay:ENDPROC
2750 VDU 11:PROCspc
2760 PRINTg$"Loading "f$"....Please Wai
t!"
2770 VDU 21:PROCoscar("EXEC "+f$)
2780 PROCtypearray(1)
2790 VDU 6:lettergrid$=f$:PROCblank
2800 ENDPROC
2810 :
2820 DEF PROCtypearray(d)
2830 REPEAT:CLS
2840 PRINTc$"Please type each line of t
he grid"
2850 PRINTc$"without spaces between let
ters."
2860 PRINTc$"When you have finished"
2870 PRINTc$"just press RETURN by itsel
f."'
2880 no%=0
2890 REPEAT no%=no%+1
2900 PRINTy$"line ";no%,;":"w$;
2910 INPUT""line$(no%)
2920 UNTIL line$(no%)=""
2930 lines%=no%-1
2940 IF lines%<2 AND d<>1 VDU 6:PRINTr$
"Not enough lines for a grid!":PROCdelay
:PROCend:ENDPROC
2950 IF d=1 UNTIL TRUE:ENDPROC
2960 PRINTy$"Is this Grid correct?";
2970 UNTIL FNyes
2980 lettergrid$="Keyed"
2990 PROCblank
3000 ENDPROC
3010 :
3020 DEF PROCsavearray
3030 PRINT'y$"What is the gridfile's na
me?"w$;
3040 INPUT""f$
3050 channel=OPENINf$:CLOSE#channel
3060 IF channel>0 PRINTr$"File already
exists!":PROCdelay:ENDPROC
3070 PRINTg$"Saving "f$"  .....Please w
ait!"
3080 VDU 21:PROCoscar("SPOOL "+f$)
3090 FOR no%=1 TO lines%
3100 PRINTline$(no%)
3110 NEXT no%
3120 PRINT""
3130 *SPOOL
3140 lettergrid$=f$
3150 VDU 6
3160 ENDPROC
3170 :
3180 DEF FNyes
3190 REPEAT A$=CHR$(GET AND 223):UNTILA
$="Y" OR A$="N"
```

Continued ▶

◀ Continued

```
3200 PRINTA$
3210 IF A$="Y" THEN =TRUE ELSE =FALSE
3220 :
3230 DEF PROCend
3240 PRINT"Done!"
3250 END
3260 :
3270 DEF PROCenterwords
3280 PRINT'y$"Use an existing wordfile
(Y/N)?"w$;
3290 IF NOT FNyes PROCtypewords(0):ENDP
ROC
3300 VDU 11:PROCspc
3310 PRINTy$"What is the wordfile's nam
e?"w$;
3320 INPUT""f$
3330 channel=OPENINf$:CLOSE#channel
3340 IF channel=0 PRINTr$"No such File"
:PROCdelay:ENDPROC
3350 VDU 11:PROCspc
3360 PRINTg$"Loading "f$".....Please wa
it!"
3370 VDU 21:PROCoscar("EXEC "+f$)
3380 PROCtypewords(1)
3390 VDU 6:wordlist$=f$
3400 ENDPROC
3410 :
3420 DEF PROCtypewords(d)
3430 REPEAT:CLS
3440 PRINTc$"Please type each word on a
 new line."
3450 PRINTc$"When you have finished,"
3460 PRINTc$"just press RETURN by itsel
f."
3470 no%=0
3480 REPEAT no%=no%+1
3490 PRINTy$"word ";no%,;":"w$;
3500 INPUT""word$(no%)
3510 UNTIL word$(no%)=""
3520 words%=no%-1
3530 IF words%<1 AND d<>1 VDU6:PRINTr$"
Not enough words for a grid!":UNTILTRUE:
PROCdelay:PROCend:ENDPROC
3540 IF d=1 UNTIL TRUE:ENDPROC
3550 PRINTy$"Are these Words correct?"w
$;
3560 UNTIL FNyes
3570 wordlist$="Keyed"
3580 ENDPROC
3590 :
3600 DEF PROCsavewords
3610 PRINT'y$"What is the wordfile's na
me?"w$;:INPUT""f$
3620 channel=OPENINf$:CLOSE#channel
3630 IF channel>0 PRINTr$"File already
exists!":PROCdelay:ENDPROC
3640 VDU 11:PROCspc
3650 PRINTg$"Saving "f$" ....Please wai
t!"
3660 VDU 21:PROCoscar("SPOOL "+f$)
3670 FOR no%=1 TO words%
3680 PRINTword$(no%)
3690 NEXT no%
3700 PRINT""
3710 *SPOOL
3720 VDU 6
3730 wordlist$=f$
3740 ENDPROC
3750 :
3760 DEF PROCspc
```

Continued ▶

◄ Continued

```
 3770 PRINTSTRING$(80," "):VDU11,11,11
 3780 ENDPROC
 3790 :
 3800 DEF PROCdelay
 3810 VDU 7
 3820 *FX 21,0
 3830 dummy=INKEY(300)
 3840 ENDPROC
```

Listing 2. Helps you design your own wordsearch puzzles

```
   10 REM Wordsearch Designer
   20 REM by Joe Telford
   30 REM for BBC B/B+/M
   40 REM (c) Acorn User July 1986
   50 :
   60 CLOSE#0
   70 MODE 7
   80 DIM line$(30),word$(80),g$(30,30),
oscar% 256
   90 lines%=0:words%=0:width%=0
  100 lettergrid$="Blank"
  110 wordlist$="Blank"
  120 PROCtitle
  130 ON ERROR PROCerr
  140 REPEAT
  150 choice=FNmenu
  160 IF choice=1 PROCenterwords
  170 IF choice=2 PROCsavewords
  180 IF choice=3 PROCsortwords(0)
  190 IF choice=4 PROCcreate
  200 IF choice=5 PROCsavearray
  210 IF choice=6 PROCpreview(3,1)
  220 IF choice=7 PROCpreview(2,1)
  230 IF choice=8 PROCwrdview(3,1)
  240 IF choice=9 PROCwrdview(2,1)
  250 IF choice=10 RUN
  260 UNTIL choice=11
  270 CLS
  280 PRINT"Done!":END
  290 END
  300 :
  310 DEF PROCoscar($oscar%)
  320 X%=oscar% MOD 256
  330 Y%=oscar% DIV 256
  340 CALL &FFF7
  350 ENDPROC
  360 :
  370 DEF PROCerr
  380 VDU 6,3:CLOSE#0:*SPOOL
  390 IF ERR=17 ENDPROC
  400 REPORT:PRINT" at ";ERL
  410 END
  420 :
  430 DEF PROCpad
  440 PRINT''c$"Padding blanks......Plea
se wait!"
  450 LOCAL row,col
  460 FOR row=1 TO lines%
  470 line$(row)=""
  480 FOR col=1 TO width%
  490 IF g$(row,col)="." THEN g$(row,col
)=CHR$(RND(26)+64)
  500 line$(row)=line$(row)+g$(row,col)
  510 NEXT col,row
  520 lettergrid$="Filled"
  530 ENDPROC
  540 :
  550 DEF PROCfitwords
```

Continued ►

◄ Continued

```
  560 LOCAL success:success=0
  570 FOR wrd%=1 TO words%
  580 result=FNfit(word$(wrd%))
  590 IF result THEN PROCpreview(3,0):PR
INTg$;:success=success+1: ELSE PRINTr$;
  600 PRINTword$(wrd%);:IF NOTresult PRI
NT" not";
  610 PRINT" fitted."
  620 NEXT
  630 PRINTg$"Success: ";success" out of
: ";words%
  640 PROCspace
  650 ENDPROC
  660 :
  670 DEF FNfit(wrd$)
  680 result=FALSE
  690 FOR try=1 TO lines%*width%
  700 col=RND(width%)
  710 row=RND(lines%):dir=RND(8)
  720 result=FNcheckfit(row,col,dir)
  730 IF result=TRUE THEN try=lines%*wid
th%:NEXTtry:=result
  740 NEXT try
  750 FOR row=1 TO lines%
  760 FOR col=1 TO width%
  770 FOR dir=1 TO 8
  780 result=FNcheckfit(row,col,dir)
  790 IF result=TRUE row=lines%:col=widt
h%:dir=8:NEXT:NEXT:NEXT:=result
  800 NEXT:NEXT:NEXT
  810 =result
  820 :
  830 DEF FNcheckfit(L%,W%,D%)
  840 LOCAL result:result=FALSE
  850 IF D%=8 THEN result=FNcheckr(L%,W%
)
  860 IF D%=7 THEN result=FNcheckrd(L%,W
%)
  870 IF D%=6 THEN result=FNcheckru(L%,W
%)
  880 IF D%=5 THEN result=FNcheckl(L%,W%
)
  890 IF D%=4 THEN result=FNcheckld(L%,W
%)
  900 IF D%=3 THEN result=FNchecklu(L%,W
%)
  910 IF D%=2 THEN result=FNchecku(L%,W%
)
  920 IF D%=1 THEN result=FNcheckd(L%,W%
)
  930 =result
  940 :
  950 DEF PROCmap(rd,cd,er,ec)
  960 FOR pool%=LENwrd$ TO 1 STEP-1
  970 er=er-rd:ec=ec-cd
  980 g$(er,ec)=MID$(wrd$,pool%,1)
  990 NEXT
 1000 ENDPROC
 1010 :
 1020 DEF FNcheckd(r%,c%)
 1030 IF LENwrd$ + r% >lines%+1 THEN =FA
LSE
 1040 FOR ptr%=1 TO LEN(wrd$)
 1050 IF MID$(wrd$,ptr%,1)<>g$(r%,c%) AN
D g$(r%,c%)<>"." THEN ptr%=LEN(wrd$):NEX
T:=FALSE
 1060 r%=r%+1:c%=c%+0
 1070 NEXT
 1080 PROCmap(1,0,r%,c%)
 1090 =TRUE
```

Continued ►

Joe's listing 2 continued

```
 1100 :
 1110 DEF FNchecku(r%,c%)
 1120 IF r%-LENwrd$<0 THEN =FALSE
 1130 FOR ptr%=1 TO LEN(wrd$)
 1140 IF MID$(wrd$,ptr%,1)<>g$(r%,c%) AN
D g$(r%,c%)<>"." THEN ptr%=LEN(wrd$):NEX
T:=FALSE
 1150 r%=r%-1:c%=c%+0
 1160 NEXT
 1170 PROCmap(-1,0,r%,c%)
 1180 =TRUE
 1190 :
 1200 DEF FNchecklu(r%,c%)
 1210 IF c%-LENwrd$<0 THEN =FALSE
 1220 IF r%-LENwrd$<0 THEN =FALSE
 1230 FOR ptr%=1 TO LEN(wrd$)
 1240 IF MID$(wrd$,ptr%,1)<>g$(r%,c%) AN
D g$(r%,c%)<>"." THEN ptr%=LEN(wrd$):NEX
T:=FALSE
 1250 r%=r%-1:c%=c%-1
 1260 NEXT
 1270 PROCmap(-1,-1,r%,c%)
 1280 =TRUE
 1290 :
 1300 DEF FNcheckld(r%,c%)
 1310 IF c%-LENwrd$ <0 THEN =FALSE
 1320 IF LENwrd$ + r% >lines%+1 THEN =FA
LSE
 1330 FOR ptr%=1 TO LEN(wrd$)
 1340 IF MID$(wrd$,ptr%,1)<>g$(r%,c%) AN
D g$(r%,c%)<>"." THEN ptr%=LEN(wrd$):NEX
T:=FALSE
 1350 r%=r%+1:c%=c%-1
 1360 NEXT
 1370 PROCmap(1,-1,r%,c%)
 1380 =TRUE
 1390 :
 1400 DEF FNcheckl(r%,c%)
 1410 IF c%-LENwrd$<0 THEN =FALSE
 1420 FOR ptr%=1 TO LEN(wrd$)
 1430 IF MID$(wrd$,ptr%,1)<>g$(r%,c%) AN
D g$(r%,c%)<>"." THEN ptr%=LEN(wrd$):NEX
T:=FALSE
 1440 r%=r%+0:c%=c%-1
 1450 NEXT
 1460 PROCmap(0,-1,r%,c%)
 1470 =TRUE
 1480 :
 1490 DEF FNcheckru(r%,c%)
 1500 IF LENwrd$+c%>width%+1 THEN =FALSE
 1510 IF r%-LENwrd$<0 THEN =FALSE
 1520 FOR ptr%=1 TO LEN(wrd$)
 1530 IF MID$(wrd$,ptr%,1)<>g$(r%,c%) AN
D g$(r%,c%)<>"." THEN ptr%=LEN(wrd$):NEX
T:=FALSE
 1540 r%=r%-1:c%=c%+1
 1550 NEXT
 1560 PROCmap(-1,1,r%,c%)
 1570 =TRUE
 1580 :
 1590 DEF FNcheckrd(r%,c%)
 1600 IF LENwrd$+c%>width%+1 THEN =FALSE
 1610 IF LENwrd$+r%>lines%+1 THEN =FALSE
 1620 FOR ptr%=1 TO LEN(wrd$)
 1630 IF MID$(wrd$,ptr%,1)<>g$(r%,c%) AN
D g$(r%,c%)<>"." THEN ptr%=LEN(wrd$):NEX
T:=FALSE
 1640 r%=r%+1:c%=c%+1
 1650 NEXT
 1660 PROCmap(1,1,r%,c%)
```

Continued ▶

◀ Continued

```
 1670 =TRUE
 1680 :
 1690 DEF FNcheckr(r%,c%)
 1700 IF LENwrd$+c%>width%+1 THEN =FALSE
 1710 FOR ptr%=1 TO LEN(wrd$)
 1720 IF MID$(wrd$,ptr%,1)<>g$(r%,c%) AN
D g$(r%,c%)<>"." THEN ptr%=LEN(wrd$):NEX
T:=FALSE
 1730 r%=r%+0:c%=c%+1
 1740 NEXT
 1750 PROCmap(0,1,r%,c%)
 1760 =TRUE
 1770 :
 1780 DEF PROCwrdview(p%,d%)
 1790 IF words%<1 PRINTr$"Bad wordlist!"
:PROCdelay:ENDPROC
 1800 CLS:VDUp%
 1810 IF p%=3 VDU14:PRINTy$"Use SHIFT to
 scroll."
 1820 FOR loop%=1 TO words% STEP 2
 1830 PRINTword$(loop%);SPC(20-LEN(word$
(loop%)));
 1840 IF (loop%+1)<=words% PRINTword$(lo
op%+1) ELSE PRINT
 1850 NEXT
 1860 VDU 3,15:IF d%=0 ENDPROC
 1870 PROCspace
 1880 ENDPROC
 1890 :
 1900 DEF PROCpreview(p%,d%)
 1910 IF width%<1 OR lines%<2 PRINTr$"Ba
d lettergrid!":PROCdelay:ENDPROC
 1920 CLS
 1930 VDU p%
 1940 FOR loop%=1 TO lines%
 1950 FOR inloop%=1 TO width%
 1960 PRINTg$(loop%,inloop%);
 1970 IF p%=2 VDU1,32
 1980 NEXT:PRINT:NEXT
 1990 VDU 3:IF d%=0 ENDPROC
 2000 PROCspace
 2010 ENDPROC
 2020 :
 2030 DEF PROCblank
 2040 IF lines%<1 PRINTr$"Bad lettergrid
!":PROCdelay:ENDPROC
 2050 PRINTg$"Blanking target grid .....
..Please wait"
 2060 FOR loop%=1 TO lines%
 2070 FOR inloop%=1 TO width%
 2080 g$(loop%,inloop%)="."
 2090 NEXT:NEXT
 2100 ENDPROC
 2110 :
 2120 DEF PROCtitle
 2130 y$=CHR$131:b$=CHR$132:r$=CHR$129
 2140 g$=CHR$130:d$=CHR$141:n$=CHR$157
 2150 w$=CHR$135:c$=CHR$134:m$=CHR$133
 2160 CLS
 2170 PRINTd$y$SPC9"Wordsearch Designer"
 2180 PRINTd$y$SPC9"Wordsearch Designer"
 2190 PRINTb$n$y$SPC7"(c) Joe Telford 19
86."
 2200 VDU 28,0,24,39,3
 2210 ENDPROC
 2220 :
 2230 DEF FNmenu
 2240 REPEAT:CLS
 2250 PRINTm$"Lettergrid:"c$;lettergrid$
;
```

Continued ▶

◀ Continued

```
 2260 PRINTTAB(20,VPOS);m$"Wordlist:"c$;
wordlist$
 2270 PRINTc$SPC3"1  ..."y$"Load Word Li
st."
 2280 PRINTc$SPC3"2  ..."y$"Save Word Li
st."
 2290 PRINTc$SPC3"3  ..."y$"Sort Word Li
st."
 2300 PRINTc$SPC3"4  ..."y$"Design Lette
r Grid."
 2310 PRINTc$SPC3"5  ..."y$"Save Letter
Grid."
 2320 PRINTc$SPC3"6  ..."y$"Preview Grid
."
 2330 PRINTc$SPC3"7  ..."y$"Print Grid"
 2340 PRINTc$SPC3"8  ..."y$"Preview Word
 List."
 2350 PRINTc$SPC3"9  ..."y$"Print Word L
ist."
 2360 PRINTc$SPC3"10 ..."y$"Reset."
 2370 PRINTc$SPC3"11 ..."y$"Exit Wordsea
rch."
 2380 PRINTy$"Which?"w$;:INPUT""choice
 2390 UNTIL choice>0 AND choice<12
 2400 =choice
 2410 :
 2420 DEF PROCsavearray
 2430 IF lines%<=2 OR width%<2 PRINTr$"N
o Grid!":PROCdelay:ENDPROC
 2440 PRINT'y$"What is the gridfile's na
me?"w$;
 2450 INPUT""f$
 2460 channel=OPENINf$:CLOSE#channel
 2470 IF channel>0 PRINTr$"File already
exists!":PROCdelay:ENDPROC
 2480 PRINTg$"Saving "f$"  .....Please w
ait!"
 2490 VDU 21
 2500 PROCoscar("SPOOL "+f$)
 2510 FOR no%=1 TO lines%
 2520 PRINTline$(no%)
 2530 NEXT no%
 2540 PRINT""
 2550 *SPOOL
 2560 lettergrid$=f$
 2570 VDU 6
 2580 ENDPROC
 2590 :
 2600 DEF FNyes
 2610 REPEAT A$=CHR$(GET AND 223):UNTILA
$="Y" OR A$="N"
 2620 PRINTA$
 2630 IF A$="Y" THEN =TRUE ELSE =FALSE
 2640 :
 2650 DEF PROCend
 2660 PRINT"Done!"
 2670 END
 2680 :
 2690 DEF PROCenterwords
 2700 PRINT'y$"Use an existing wordfile
(Y/N)?"w$;
 2710 IF NOT FNyes PROCtypewords(0):ENDP
ROC
 2720 VDU 11:PROCspc
 2730 PRINTy$"What is the wordfile's nam
e?"w$;
 2740 INPUT""f$
 2750 channel=OPENINf$:CLOSE#channel
 2760 IF channel=0 PRINTr$"No such File"
:PROCdelay:ENDPROC
 2770 VDU 11:PROCspc
```

Continued ▶

◀ Continued

```
 2780 PRINTg$"Loading "f$".....Please wa
it!"
 2790 VDU 21
 2800 PROCoscar("EXEC "+f$)
 2810 PROCtypewords(1)
 2820 VDU 6:wordlist$=f$
 2830 ENDPROC
 2840 :
 2850 DEF PROCtypewords(d)
 2860 REPEAT:CLS
 2870 PRINTc$"Please type each word on a
 new line."
 2880 PRINTc$"When you have finished,"
 2890 PRINTc$"just press RETURN by itsel
f."
 2900 no%=0
 2910 REPEAT no%=no%+1
 2920 PRINTy$"word ";no%,;":"w$;
 2930 INPUT""word$(no%)
 2940 UNTIL word$(no%)=""
 2950 words%=no%-1
 2960 IF words%<1 AND d<>1 VDU 6:PRINTr$
"Not enough words for a grid!":UNTIL TRU
E:PROCdelay:PROCend:ENDPROC
 2970 IF d=1 UNTIL TRUE:ENDPROC
 2980 PRINTy$"Are these Words correct?"w
$;
 2990 UNTIL FNyes
 3000 wordlist$="Keyed"
 3010 ENDPROC
 3020 :
 3030 DEF PROCsavewords
 3040 PRINT'y$"What is the wordfile's na
me?"w$;
 3050 INPUT""f$
 3060 channel=OPENINf$:CLOSE#channel
 3070 IF channel>0 PRINTr$"File already
exists!":PROCdelay:ENDPROC
 3080 VDU 11:PROCspc:PRINTg$"Saving "f$"
 ....Please wait!"
 3090 VDU 21
 3100 PROCoscar("SPOOL "+f$)
 3110 FOR no%= 1 TO words%
 3120 PRINTword$(no%)
 3130 NEXT no%
 3140 PRINT""
 3150 *SPOOL
 3160 VDU 6
 3170 wordlist$=f$
 3180 ENDPROC
 3190 :
 3200 DEF PROCspc
 3210 PRINTSTRING$(80," "):VDU 11,11,11
 3220 ENDPROC
 3230 :
 3240 DEF PROCdelay
 3250 VDU 7
 3260 *FX 21,0
 3270 dummy=INKEY(300)
 3280 ENDPROC
 3290 :
 3300 DEF PROCsortwords(type)
 3310 IF words%<2 PRINTr$"Bad Wordlist!"
:PROCdelay:ENDPROC
 3320 PRINT'g$"Sorting Words.....Please
wait!"
 3330 LOCAL outer%,inner%,pointer%
 3340 FOR outer%=1 TO words%-1
 3350 pointer%=outer%
 3360 FOR inner%=outer%+1 TO words%
```

Continued ▶

Joe's listing 2 continued

```
 3370 IF type=0 THEN IF word$(inner%)<wo
rd$(pointer%) pointer%=inner%
 3380 IF type=1 THEN IF LEN(word$(inner%
))>LEN(word$(pointer%)) pointer%=inner%
 3390 NEXT inner%
 3400 IF pointer%<>outer% PROCswap(point
er%,outer%)
 3410 NEXT outer%
 3420 ENDPROC
 3430 :
 3440 DEF PROCswap(a%,b%)
 3450 LOCAL spare$
 3460 spare$=word$(b%)
 3470 word$(b%)=word$(a%)
 3480 word$(a%)=spare$
 3490 ENDPROC
 3500 :
 3510 DEF PROCsubsume
 3520 VDU 11:PROCspc
 3530 PRINTc$"Subsuming Words.....Please
 wait!"
 3540 LOCAL outer%,inner%,pointer%
 3550 outer%=words%
 3560 REPEAT
 3570 pointer%=outer%
 3580 FOR inner%=1 TO outer%-1
 3590 IF INSTR(word$(inner%),word$(point
er%))>0 pointer%=inner%
 3600 NEXT inner%
 3610 IF pointer%<>outer% PROCdelete(out
er%)
 3620 outer%=outer%-1
 3630 UNTIL outer%=2
 3640 ENDPROC
 3650 :
 3660 DEF PROCdelete(outer%)
 3670 IF outer%=words% word$(words%)="":
words%=words%-1:ENDPROC
 3680 LOCAL loop%
```

Continued ▶

◀ Continued

```
 3690 FOR loop%=outer%+1 TO words%
 3700 word$(loop%-1)=word$(loop%)
 3710 NEXT loop%
 3720 word$(words%)=""
 3730 words%=words%-1
 3740 ENDPROC
 3750 :
 3760 DEF PROCcalcsize
 3770 VDU 11:PROCspc
 3780 PRINTg$"Calculating gridsize.....P
lease wait!"
 3790 longest=LEN(word$(1)):letters=0
 3800 FOR loop%=1 TO words%
 3810 letters=letters+LEN(word$(loop%))
 3820 NEXT
 3830 VDU 11:PROCspc
 3840 lines%=INT(SQR(letters))+1
 3850 IF INT(lines%)<(longest+1) THEN li
nes%=longest+1
 3860 width%=lines%
 3870 PRINTc$"Letters: ";letters;m$" lon
gest word: ";longest:PROCdelay
 3880 ENDPROC
 3890 :
 3900 DEF PROCcreate
 3910 IF words%<2 PRINTr$"Bad Wordlist!"
:PROCdelay:ENDPROC
 3920 PROCsortwords(1)
 3930 PROCsubsume
 3940 PROCcalcsize
 3950 PROCblank
 3960 PROCfitwords
 3970 PROCpad
 3980 ENDPROC
 3990 :
 4000 DEF PROCspace
 4010 *FX 21,0
 4020 PRINT"---Press--Space-Bar---";
 4030 REPEAT UNTIL GET=32
 4040 ENDPROC
```

See Back to the Roots, page 88

Listing 1. Finds out which points converge to which roots (NB: Width = 24 for this listing)

```
   10 REM Complex Roots
 - listing 1
   20 REM by David Johns
on-Davies
   30 REM for BBC B/B+/M
/E
   40 REM (c) Acorn User
 July 1986
   50 :
   60 TIME=0
   70 MODE 1:e=.5*.5
   80 VDU 28,32,31,39,0
   90 INPUT"x,y:"j,k
  100 INPUT"  s:"q
  110 VDU 19,1,3;0;19,2,
1;0;19,3,6;0;
  120 Q%=1024:M%=1
  130 REPEAT
  140 i=q/M%:I%=Q%/M%
  150 FOR J%=0 TO M%-1
  160 FOR K%=0 TO M%-1
  170 IF K% MOD 2 OR J%
MOD 2 PROCpt
  180 NEXT:NEXT
  190 M%=M%*2:PRINT M%
  200 UNTIL M%=512
  210 T%=TIME:PRINTT%/10
0" SECS."
  220 END
  230 :
  240 DEF PROCplus(u,v)
  250 x=x+u:y=y+v:ENDPRO
C
  260 :
  270 DEF PROCtimes(u,v)
:LOCAL t
  280 t=x*u-y*v:y=x*v+y*
u:x=t:ENDPROC
  290 :
  300 DEF PROCdivide(u,v
):LOCAL t,d
  310 d=u*u+v*v:t=x*u+y*
v
  320 y=(y*u-x*v)/d:x=t/
d:ENDPROC
  330 :
  340 DEF FNn(x,y)
  350 N%=-1:IF x=0 AND y
=0 =0
  360 REPEAT u=x:v=y
  370 PROCtimes(u,v):x2=
x:y2=y
  380 PROCtimes(u,v):x3=
x-1:y3=y
  390 x=2*x+1:y=2*y
  400 PROCdivide(3*x2,3*
y2)
  410 N%=N%+1
  420 UNTIL x3*x3+y3*y3<
e
  430 IF x>0 =1 ELSE IF
y>0 =2 ELSE =3
  440 :
  450 DEF PROCpt
  460 x=j+i*J%:y=k+i*K%
  470 GCOL 0,FNn(x,y)
  480 X%=J%*I%:Y%=K%*I%
  490 MOVE X%,Y%:MOVE X%
+I%-1,Y%
  500 PLOT 85,X%,Y%+I%-1
  510 PLOT 85,X%+I%-1,Y%
+I%-1
  520 ENDPROC
```

Listing 2. Finds out how fast each point converges to its root (NB: Width = 24 for this listing)

```
   10 REM Complex Roots
 - listing 2
   20 REM by David Johns
on-Davies
   30 REM for BBC B/B+/M
/E
   40 REM (c) Acorn User
 July 1986
   50 :
   60 TIME=0
   70 MODE 2:e=.001
   80 VDU 28,16,31,19,0
   90 INPUT"x,y:"j,k
  100 INPUT"   s:"q
  110 VDU 19,1,6;0;19,4,
1;0;19,6,4;0;
  120 Q%=1024:M%=1
  130 REPEAT
  140 i=q/M%:I%=Q%/M%
  150 FOR J%=0 TO M%-1
  160 FOR K%=0 TO M%-1
  170 IF K% MOD 2 OR J%
MOD 2 PROCpt
  180 NEXT:NEXT
  190 M%=M%*2:PRINT M%
  200 UNTIL M%=256
  210 T%=TIME:PRINT T%/1
00 " SECS."
  220 END
  230 :
  240 DEF PROCplus(u,v)
  250 x=x+u:y=y+v:ENDPRO
C
  260 :
  270 DEF PROCtimes(u,v)
:LOCAL t
  280 t=x*u-y*v:y=x*v+y*
u:x=t:ENDPROC
  290 :
  300 DEF PROCdivide(u,v
):LOCAL t,d
  310 d=u*u+v*v:t=x*u+y*
v
  320 y=(y*u-x*v)/d:x=t/
d:ENDPROC
  330 :
  340 DEF FNn(x,y)
  350 N%=-1:IF x=0 AND y
=0 =0
  360 REPEAT u=x:v=y
  370 PROCtimes(u,v):x2=
x:y2=y
  380 PROCtimes(u,v):x3=
x-1:y3=y
  390 x=2*x+1:y=2*y
  400 PROCdivide(3*x2,3*
y2)
  410 N%=N%+1
  420 UNTIL x3*x3+y3*y3<
e
  430 =N%
  440 :
  450 DEF PROCpt
  460 x=j+i*J%:y=k+i*K%
  470 PROCgcol(FNn(x,y)
MOD 16)
  480 X%=J%*I%:Y%=K%*I%
  490 MOVE X%,Y%:MOVE X%
+I%-1,Y%
  500 PLOT 85,X%,Y%+I%-1
  510 PLOT 85,X%+I%-1,Y%
+I%-1
  520 ENDPROC
  530 :
  540 DEF PROCgcol(B%)
  550 GCOL 0,B%/2:ENDPRO
C
  560 :
  570 DEF PROCgcol(B%)
  580 D%=B% DIV 2
  590 E%=(D%+B% MOD 2) M
OD 8
  600 VDU 23,12,D%,E%,E%
,D%,D%,E%,E%,D%
  610 GCOL 16,0
  620 ENDPROC
```

See Get by with a little help, page 96

Listing 1. Creates the H.DATA file (NB: Width = 24 for this listing)

```
   10 REM Create
   20 REM by Barry Ambro
se
   30 REM for BBC B/B+/M
/E with discs
   40 REM (c) Acorn User
 July 1986
   50 :
   60 ON ERROR PROCerr
   70 MODE 6
   80 PRINTTAB(5);"Help-
file Creation"
   90 REPEAT
  100 PRINT TAB(0,6);SPC
(39);
  110 INPUT TAB(0,5) "Le
ngth of file containing
help"'"information (2K -
 90K)  ==> "len%
  120 UNTIL 2<=len% AND
len%<=90
  130 :
  140 PRINTTAB(0,11)"Now
 creating file..."
  150 PRINTTAB(0,15)
  160 DIM A% 100
  170 $A%="SAVE H.DATA 0
000 "+STR$~(len%*1024)
  180 X%=A% MOD 256
  190 Y%=A% DIV 256
  200 CALL &FFF7
  210 :
  220 ch%=OPENIN("H.DATA
")
  230 PROCwrite(20)
  240 PROCwrite(20)
  250 PROCwrite(1024*len
%*0.2)
  260 PROCwrite(1024*len
%*0.2)
  270 PROCwrite(1024*len
%)
  280 CLOSE#ch%
  290 END
  300 :
  310 DEF PROCwrite(A%)
  320 LOCAL I%
  330 FOR I%=1 TO 4
  340 BPUT#ch%,A% MOD 256
  350 A%=A% DIV 256
  360 NEXT I%
  370 ENDPROC
  380 :
  390 DEF PROCerr
  400 CLOSE#0
  410 REPORT
  420 PRINT" at line ";E
RL
  430 END
```

Listing 2. Creates the *ADD file, allowing words and descriptions to be added (NB: Width = 24 for this listing)

```
   10 REM *ADD Source
   20 REM by Barry Ambro
se
   30 REM for BBC B/B+/M
/E with discs
   40 REM (c) Acorn User
 July 1986
   50 :
   60 base%=&5000
   70 PROCequates
   80 FOR pass=0 TO 2 ST
EP 2
   90 P%=base%
  100 [OPT pass
  110 .add
  120 JSR chkscrn
  130 JSR chkparms
  140 BCC read
  150 JMP explain
  160 :
  170 .read
  180 JSR instruct
  190 JSR keyon
  200 LDA #buff% MOD 256
  210 STA index
  220 LDA #buff% DIV 256
  230 STA index+1
  240 LDA #0
  250 STA length
  260 STA length+1
  270 .loop0
  280 JSR osrdch
  290 CMP #f1
  300 BEQ fileit
  310 CMP #f8
  320 BEQ hopquit
  330 CMP #f9
  340 BEQ read
  350 CMP #127
  360 BEQ delete
  370 JSR osasci
  380 LDY #0
  390 STA (index),Y
  400 INC index
  410 BNE skip1
  420 INC index+1
```

Continued ▶

Ambrose's listing 2 continued

```
430 .skip1
440 INC length
450 BNE skip2
460 INC length+1
470 .skip2
480 JMP loop0
490 .delete
500 LDA length
510 ORA length+1
520 BEQ loop0
530 SEC
540 LDA index
550 SBC #1
560 STA index
570 LDA index+1
580 SBC #0
590 STA index+1
600 LDY #0
610 LDA (index),Y
620 CMP #32
630 BCC nodisp
640 LDA #127
650 JSR osasci
660 .nodisp
670 SEC
680 LDA length
690 SBC #1
700 STA length
710 LDA length+1
720 SBC #0
730 STA length+1
740 JMP loop0
750 .hopquit
760 JMP quit
770 :
780 .fileit
790 LDX #namebuff MOD 256
800 LDY #namebuff DIV 256
810 LDA #&C0
820 JSR osfind
830 BNE filefound
840 JSR close
850 JSR keysoff
860 BRK
870 BRK
880 OPT FNequs("File H.DATA not found")
890 BRK
900 :
910 .filefound
920 STA handle
930 LDX #0
940 .copypointers
950 JSR readbyte
960 STA keybeg,X
970 INX
980 CPX #20
990 BCC copypointers
1000 :
1010 LDX #0
1020 .note1
1030 LDA keyend,X
1040 STA keypos,X
1050 INX
1060 CPX #4
1070 BCC note1
1080 LDX #0
1090 LDY #4
1100 CLC
1110 .aloop
1120 LDA keyend,X
1130 ADC add14,X
1140 STA keyend,X
1150 INX
1160 DEY
1170 BNE aloop
1180 LDX #4
1190 .cloop
1200 LDA keyend-1,X
1210 CMP entbeg-1,X
1220 BNE chkrm1
1230 DEX
1240 BNE cloop
1250 .chkrm1
1260 BCC chkrm2
1270 JSR keysoff
1280 JSR close
1290 BRK
1300 BRK
1310 OPT FNequs("Help file is full")
1320 OPT FNequb(13)
1330 BRK
1340 .chkrm2
1350 LDA length
1360 STA addent
1370 LDA length+1
1380 STA addent+1
1390 LDX #0
1400 .note2
1410 LDA entend,X
1420 STA position,X
1430 STA entpos,X
1440 INX
1450 CPX #4
1460 BCC note2
1470 :
1480 LDX #0
1490 LDY #4
1500 CLC
1510 .aloop1
1520 LDA entend,X
1530 ADC addent,X
1540 STA entend,X
1550 INX
1560 DEY
1570 BNE aloop1
1580 :
1590 LDX #4
1600 .cloop2
1610 LDA entend-1,X
1620 CMP filend-1,X
1630 BNE chkrm3
1640 DEX
1650 BNE cloop2
1660 .chkrm3
1670 BCC chkrm4
1680 JSR keysoff
1690 JSR close
1700 BRK
1710 BRK
1720 OPT FNequs("Help file is full")
1730 OPT FNequb(13)
1740 BRK
1750 .chkrm4
1760 LDX #keypos
1770 LDY handle
1780 LDA #1
1790 JSR osargs
1800 LDX #0
1810 .wrtkey
1820 LDA keybuff%,X
1830 JSR putbyte
1840 INX
1850 CPX #14
1860 BCC wrtkey
1870 LDX #entpos
1880 LDY handle
1890 LDA #1
1900 JSR osargs
1910 SEC
1920 LDA #0
1930 SBC length
1940 STA count
1950 LDA #0
1960 SBC length+1
1970 STA count+1
1980 ORA count
1990 BEQ skipwrt
2000 LDA #buff% MOD 256
2010 STA index
2020 LDA #buff% DIV 256
2030 STA index+1
2040 .wrtent
2050 LDY #0
2060 LDA (index),Y
2070 JSR putbyte
2080 INC index
2090 BNE skip17
2100 INC index+1
2110 .skip17
2120 INC count
2130 BNE wrtent
2140 INC count+1
2150 BNE wrtent
2160 .skipwrt
2170 LDA #0
2180 TAX
2190 .clrpnt
2200 STA pointer,X
2210 INX
2220 CPX #4
2230 BCC clrpnt
2240 LDX #pointer
2250 LDY handle
2260 LDA #1
2270 JSR osargs
2280 LDX #0
2290 .wrtpnt
2300 LDA keybeg,X
2310 JSR putbyte
2320 INX
2330 CPX #20
2340 BCC wrtpnt
2350 :
2360 JSR close
2370 .quit
2380 JSR keysoff
2390 RTS
2400 \ Subroutines
2410 .keyon
2420 LDA #&E1
2430 LDX #&80
2440 LDY #0
2450 JMP osbyte
2460 :
2470 .keysoff
2480 LDA #&E1
2490 LDX #&01
2500 LDY #0
2510 JMP osbyte
2520 :
2530 .explain
2540 JSR osnewl
```

Continued ►

◀ Ambrose's listing 2 continued

```
2550 LDX #0
2560 .loop
2570 LDA expmess,X
2580 BEQ rts1
2590 JSR osasci
2600 INX
2610 JMP loop
2620 .rts1
2630 RTS
2640 :
2650 .instruct
2660 JSR osnewl
2670 LDX #0
2680 .loop1
2690 LDA insmess,X
2700 BEQ keybit
2710 JSR osasci
2720 INX
2730 JMP loop1
2740 .keybit
2750 LDX #0
2760 .prloop
2770 LDA keyword,X
2780 JSR osasci
2790 INX
2800 CPX #9
2810 BNE prloop
2820 JSR osnewl
2830 LDX #0
2840 .loop2
2850 LDA insmess1,X
2860 BEQ rts1
2870 JSR osasci
2880 INX
2890 JMP loop2
2900 :
2910 .readbyte
2920 LDY handle
2930 JMP osbget
2940 :
2950 .chkscrn
2960 LDA #135
2970 JSR osbyte
2980 CPY #6
2990 BCS scrnok
3000 LDA #22
3010 JSR osasci
3020 LDA #6
3030 JSR osasci
3040 .scrnok
3050 RTS
3060 :
3070 .chkparms
3080 LDA #1
3090 LDX #parmbuff
3100 LDY #0
3110 JSR osargs
3120 LDA parmbuff
3130 STA gs
3140 LDA parmbuff+1
3150 STA gs+1
3160 LDY #0
3170 CLC
3180 LDX #0
3190 JSR gsinit
3200 BEQ bad
3210 .readloop
3220 JSR gsread
3230 BCS pad
3240 CMP #ASC"z"+1
3250 BCS ok
3260 CMP #ASC"a"
3270 BCC ok
3280 SBC #(ASC"a"-ASC"A
")
3290 .ok
3300 STA keyword,X
3310 INX
3320 CPX #8
3330 BEQ parmgot
3340 JMP readloop
3350 .pad
3360 LDA #ASC" "
3370 .padloop
3380 STA keyword,X
3390 INX
3400 CPX #8
3410 BNE padloop
3420 .parmgot
3430 CLC
3440 RTS
3450 .bad
3460 SEC
3470 RTS
3480 :
3490 .close
3500 LDA #0
3510 LDY handle
3520 JMP osfind
3530 :
3540 .putbyte
3550 LDY handle
3560 JMP osbput
3570 :
3580 \ Data
3590 :
3600 .count
3610 BRK
3620 BRK
3630 .handle
3640 BRK
3650 .namebuff
3660 OPT FNequs("H.DATA
")
3670 OPT FNequb(13)
3680 .keybuff%
3690 .keyword
3700 OPT FNequs("aaaaaa
aa")
3710 .position
3720 BRK
3730 BRK
3740 BRK
3750 BRK
3760 .length
3770 BRK
3780 BRK
3790 .add14
3800 OPT FNequd(14)
3810 .addent
3820 BRK
3830 BRK
3840 BRK
3850 BRK
3860 .expmess
3870 OPT FNequs("*ADD <
keyword>")
3880 OPT FNequb(13)
3890 OPT FNequs("Use th
is command to add an ent
ry to the help files sto
red on disc.")
3900 OPT FNequb(13)
3910 OPT FNequs("The ke
yword may be up to 8 cha
racters")
3920 OPT FNequb(13)
3930 OPT FNequs("in len
gth and there is no limi
t to the")
3940 OPT FNequb(13)
3950 OPT FNequs("length
 of the associated entry
.")
3960 OPT FNequb(13)
3970 OPT FNequs("Use th
e *H command to look at
any of")
3980 OPT FNequb(13)
3990 OPT FNequs("the en
tries.")
4000 OPT FNequb(13)
4010 BRK
4020 .insmess
4030 OPT FNequs(STRING$
(38,"-"))
4040 OPT FNequb(13)
4050 OPT FNequs("Please
 type in entry for ")
4060 BRK
4070 .insmess1
4080 OPT FNequs("Use fu
nction key f1 to save to
 disc")
4090 OPT FNequb(13)
4100 OPT FNequs("Use fu
nction key f8 to quit")
4110 OPT FNequb(13)
4120 OPT FNequs("Use fu
nction key f9 to start a
gain")
4130 OPT FNequb(13)
4140 OPT FNequs(STRING$
(38,"-"))
4150 OPT FNequb(13)
4160 OPT FNequb(13)
4170 BRK
4180 .end
4190 JNEXT pass
4200 :
4210 REM Checksum
4220 total%=0
4230 FOR byte%=base% TO
 P%-1
4240 total%=total%+?byt
e%
4250 NEXT
4260 IF total%<>121286
PRINT"Checksum error - p
lease check listing":END
4270 PROCsave
4280 PRINT"Code saved":
END
4290 :
4300 DEF PROCequates
4310 keybeg=&80:keyend=
&84
4320 entbeg=&88:entend=
&8C
4330 filend=&90:index=&
94
4340 pointer=&96:parmbu
ff=&96
4350 keypos=&96:entpos=
&9A
4360 f1=&81:f8=&88:f9=&
89
4370 gs=&F2
4380 osnewl=&FFE7:osrdc
h=&FFE0
```

Continued ▶

◀ **Ambrose's listing 2 continued**

```
 4390 osbyte=&FFF4:oswrc
h=&FFEE
 4400 osasci=&FFE3
 4410 gsinit=&FFC2:gsrea
d=&FFC5
 4420 osbput=&FFD4:osbge
t=&FFD7
 4430 osargs=&FFDA:osfin
d=&FFCE
 4440 buff%=&5600
 4450 ENDPROC
 4460 :
 4470 DEF PROCsave
 4480 DIM A% 100
 4490 X%=A% MOD 256
 4500 Y%=A% DIV 256
 4510 $A%="SAVE $.ADD "+
STR$~add+" "+STR$~end
 4520 CALL &FFF7
 4530 ENDPROC
 4540 :
 4550 DEF FNequs(string$
)
 4560 $P%=string$
 4570 P%=P%+LEN(string$)
 4580 =pass
 4590 :
 4600 DEF FNequb(byte%)
 4610 ?P%=byte%
 4620 P%=P%+1
 4630 =pass
 4640 :
 4650 DEF FNequd(doublew
ord%)
 4660 !P%=doubleword%
 4670 P%=P%+4
 4680 =pass
```

◀ **Listing 3. Creates *H, allowing keywords to be read back. (NB: WIDTH = 24 for this listing)**

```
   10 REM *H Source
   20 REM by Barry A
mbrose
   30 REM for BBC B/
B+/M/E with discs
   40 REM (c) Acorn
User July 1986
   50 :
   60 PROCequates
   70 PROCcode(3)
   80 PROCcheck
   90 PROCsave
  100 PRINT"Code sav
ed":END
  110 :
  120 DEF PROCequate
s
  130 keybeg=&80:key
end=&84
  140 entbeg=&88:ent
end=&8C
  150 filend=&90:poi
nter=&94
  160 parmbuff=&94:g
s=&F2
  170 osnewl=&FFE7:o
swrch=&FFEE
  180 osasci=&FFE3
  190 gsinit=&FFC2:g
sread=&FFC5
  200 osbput=&FFD4:o
sbget=&FFD7
  210 osargs=&FFDA:o
sfind=&FFCE
  220 code%=&900
  230 ENDPROC
  240 :
  250 DEF PROCsave
  260 DIM A% 100
  270 X%=A% MOD 256
  280 Y%=A% DIV 256
  290 $A%="SAVE H "+
STR$~help+" "+STR$~e
nd
  300 CALL &FFF7
  310 ENDPROC
  320 :
  330 DEF PROCcode(a
smopt)
  340 FOR pass=0 TO
asmopt STEP asmopt
  350 P%=code%
  360 [OPT pass
  370 .help
  380 JSR chkparms
  390 BCC retrieve
  400 JSR open
  410 JSR osnewl
  420 .prloop
  430 LDX #4
  440 .check
  450 LDA keybeg-1,X
  460 CMP keyend-1,X
  470 BNE morekeys
  480 DEX
  490 BEQ fin
  500 BNE check
  510 .morekeys
  520 LDX #keybeg
  530 LDY handle
  540 LDA #1
  550 JSR osargs
  560 LDX #8
  570 .kloop
  580 JSR readbyte
  590 JSR osasci
  600 DEX
  610 BNE kloop
  620 LDA #ASC" "
  630 JSR osasci
  640 JSR osasci
  650 LDX #0
  660 LDY #4
  670 CLC
  680 .aloop
  690 LDA add14,X
  700 ADC keybeg,X
  710 STA keybeg,X
  720 INX
  730 DEY
  740 BNE aloop
  750 BEQ prloop
  760 .fin
  770 JSR close
  780 JSR osnewl
  790 RTS
  800 :
  810 .retrieve
  820 JSR open
  830 JSR osnewl
  840 .scan
  850 LDX #4
  860 .check1
  870 LDA keybeg-1,X
  880 CMP keyend-1,X
  890 BNE chkmatch
  900 DEX
  910 BEQ fin
  920 BNE check1
  930 .chkmatch
  940 LDX #keybeg
  950 LDY handle
  960 LDA #1
  970 JSR osargs
  980 LDX #0
  990 .chloop
 1000 JSR readbyte
 1010 CMP keyword,X
 1020 BNE nomatch
 1030 INX
 1040 CPX #8
 1050 BNE chloop
 1060 LDX #0
 1070 .posloop
 1080 JSR readbyte
 1090 STA pointer,X
 1100 INX
 1110 CPX #4
 1120 BNE posloop
 1130 JSR readbyte
 1140 STA length
 1150 JSR readbyte
 1160 STA length+1
 1170 LDX #pointer
 1180 LDY handle
 1190 LDA #1
 1200 JSR osargs
 1210 SEC
 1220 LDA #0
 1230 SBC length
 1240 STA count
 1250 LDA #0
 1260 SBC length+1
 1270 STA count+1
 1280 ORA count
 1290 BEQ nomatch
 1300 .outloop
 1310 JSR readbyte
 1320 JSR osasci
 1330 INC count
 1340 BNE outloop
 1350 INC count+1
 1360 BNE outloop
 1370 .nomatch
 1380 CLC
 1390 LDX #0
 1400 LDY #4
 1410 .aloop1
 1420 LDA keybeg,X
 1430 ADC add14,X
 1440 STA keybeg,X
 1450 INX
 1460 DEY
 1470 BNE aloop1
 1480 BEQ scan
 1490 :
 1500 .open
 1510 LDX #namebuff%
MOD 256
 1520 LDY #namebuff%
DIV 256
 1530 LDA #&40
 1540 JSR osfind
 1550 BNE filefound
 1560 BRK
 1570 BRK
 1580 OPT FNequs("Fi
le H.DATA not found"
)
 1590 BRK
 1600 .filefound
 1610 STA handle
 1620 LDX #0
 1630 .ploop
 1640 JSR readbyte
 1650 STA keybeg,X
 1660 INX
 1670 CPX #20
 1680 BCC ploop
 1690 RTS
 1700 :
 1710 .close
 1720 LDY handle
 1730 LDA #0
 1740 JMP osfind
 1750 :
 1760 .readbyte
 1770 LDY handle
 1780 JMP osbget
 1790 :
 1800 .chkparms
 1810 LDA #1
 1820 LDX #parmbuff
 1830 LDY #0
 1840 JSR osargs
 1850 LDA parmbuff
```

Continued ▶

◀ Continued

```
1860 STA gs
1870 LDA parmbuff+1
1880 STA gs+1
1890 LDY #0
1900 CLC
1910 LDX #0
1920 JSR gsinit
1930 BEQ bad
1940 .readloop
1950 JSR gsread
1960 BCS pad
1970 CMP #ASC"z"+1
1980 BCS ok
1990 CMP #ASC"a"
2000 BCC ok
2010 SBC #(ASC"a"-ASC"A")
2020 .ok
2030 STA keyword,X
2040 INX
2050 CPX #8
2060 BEQ parmgot
2070 JMP readloop
2080 .pad
2090 LDA #ASC" "
2100 .padloop
2110 STA keyword,X
2120 INX
2130 CPX #8
2140 BNE padloop
2150 .parmgot
2160 CLC
2170 RTS
2180 .bad
2190 SEC
2200 RTS
2210 :
2220 .namebuff%
2230 OPT FNequs("H.DATA")
2240 OPT FNequb(13)
2250 .keyword
2260 OPT FNequs("aaaaaaaa")
2270 OPT FNequb(13)
2280 .length
2290 BRK
2300 BRK
2310 .count
2320 BRK
2330 BRK
2340 .add14
2350 OPT FNequd(14)
2360 .handle
2370 BRK
2380 .end
2390 ]NEXT pass
2400 :
2410 DEF PROCcheck
2420 total%=0
2430 FOR byte%=code% TO P%-1
2440 total%=total%+?byte%
2450 NEXT byte%
2460 IF total%<>42028 PRINT"Checksum error - please check listing":END
2470 ENDPROC
2480 :
2490 DEF FNequs(string$)
2500 $P%=string$
2510 P%=P%+LEN(string$)
2520 =pass
2530 :
2540 DEF FNequb(byte%)
2550 ?P%=byte%
2560 P%=P%+1
2570 =pass
2580 :
2590 DEF FNequd(doubleword%)
2600 !P%=doubleword%
2610 P%=P%+4
2620 =pass
```

See Chatting with a chip, page 143

◀ Listing 1. Demonstrates transferring data to and from a disc (NB: Width = 24 for this listing)

```
10 REM 1770 Osword Commands
20 REM by Dave Atherton
30 REM for BBC B/B+/E/M
40 REM with 1770 DFS or ADFS
50 REM (c) Acorn User July 1986
60 :
70 DIM buffer% 50,memory% &600
80 test$="This is a test string "
90 len=LEN test$
100 FOR I%=memory% TO memory%+&600 STEP len
110 $I%=test$
120 NEXT
130 PRINT"Sector read/write for DFS/ADFS machines"
140 PRINTSTRING$(39,"=")'
150 INPUT"Which drive is your DFS disc in : "dfsdrv%
160 *DISC
170 PRINT"Writing test data to DFS disc"
180 PROCsectors(memory%,2,6,dfsdrv%,FALSE,TRUE)
190 PRINT"Reading it back"
200 PROCclear
210 PROCsectors(memory%,2,6,dfsdrv%,FALSE,FALSE)
220 PROCprint
230 PRINT'"DFS disc done"'
240 INPUT"Which drive is your ADFS disc in : "adfsdrv%
250 *ADFS
260 PRINT"Writing test data to ADFS disc"
270 PROCsectors(memory%,20,6,adfsdrv%,TRUE,TRUE)
280 PRINT"Reading it back"
290 PROCclear
300 PROCsectors(memory%,20,6,adfsdrv%,TRUE,FALSE)
310 PROCprint
320 PRINT'"ADFS disc done"'
330 END
340 :
350 DEF PROCclear
360 FOR I%=0 TO &600 STEP4
370 memory%!I%=0
380 NEXT
390 ENDPROC
400 :
410 DEF PROCprint
420 FOR I%=0 TO &600
430 VDU memory%?I%
440 NEXT
450 ENDPROC
460 :
470 DEF PROCsectors(mem%,stsec%,nosec%,dr%,dblden%,write%)
480 buffer%!1=mem%
490 IF dblden% THEN 640
500 ?buffer%=dr%
510 buffer%?5=3
520 IF write% THEN buffer%?6=&4B ELSE buffer%?6=&53
530 buffer%?7=stsec% DIV 10
540 buffer%?8=stsec% MOD 10
550 IF nosec%>10 THEN PRINT"10 sectors max in s/d":END
560 buffer%?9=nosec%+&20
570 A%=&7F
580 X%=buffer% MOD 256
590 Y%=buffer% DIV 256
600 CALL &FFF1
610 error%=buffer%?10
620 IF error% THEN PRINT"Disc error &";~error%
630 ENDPROC
640 ?buffer%=0
650 IF write% THEN buffer%?5=&0A ELSE buffer%?5=&08
660 buffer%?6=dr%*32
670 buffer%?7=stsec% DIV 256
680 buffer%?8=stsec% MOD 256
690 buffer%?9=nosec%
700 buffer%!10=0
710 A%=&72
720 X%=buffer% MOD 256
730 Y%=buffer% DIV 256
740 CALL &FFF1
750 A%=&73
760 !buffer%=0:buffer%!4=0
770 CALL&FFF1
780 IF buffer%?4=&FF OR buffer%?3=&FF THEN ENDPROC
790 IF buffer%?4 THEN PRINT"Disc error in channel ";buffer%?4:END
800 error%=buffer%?3
810 IF error% THEN PRINT"Disc error &";~error%
820 ENDPROC
```

See Highlighting problems, page 173

How to enter View spoolers

Listing 2 contains all the changes to be made to listing 1 in order to create the ViewStore/ViewSheet *spooler. Having entered listing 1, you should save what you have typed and then add the lines in listing 2. The checksum routine will check for typing errors and, if none have been made, the code will be saved as V.VSXFER*

Listing 1. The source code for the *View* spooler program. (NB: WIDTH = 24)

```
   10 REM Source for
 View File Spooler
   20 REM by Graham
Bell
   30 REM for BBC B/
B+/M/E with View
   40 REM (c) Acorn
User July 1986
   50 :
   60 brkv=&202:osfi
nd=&FFCE
   70 osbput=&FFD4:o
sasci=&FFE3
   80 osword=&FFF1:o
sbyte=&FFF4
   90 :
  100 DIM store &FF
  110 FOR I%=0 TO &F
F
  120 store?I%=0
  130 NEXT
  140 offset=store-&
400
  150 :
  160 FOR pass=0 TO
3 STEP 3
  170 P%=store
  180 [OPT pass
  190 :
  200 JMP output-off
set
  210 RTS
  220 .hand
  230 OPT FNequb(0)
  240 .yreg
  250 OPT FNequb(0)
  260 JMP close-offs
et
  270 RTS
  280 .nbrk
  290 OPT FNequw(bre
ak-offset)
  300 RTS
  310 :
  320 .text
  330 OPT FNequs(" ?
 emanelif loopS")
  340 OPT FNequw(&0F
0D)
  350 :
  360 .block
  370 OPT FNequw(fil
ename-offset)
  380 OPT FNequb(&4F
F-(filename-offset))
  390 OPT FNequb(33)
  400 OPT FNequb(126
)
  410 :
  420 .openfile
  430 TXA
  440 PHA
  450 TYA
  460 PHA
  470 LDY #&12
  480 .message
  490 LDA text-offse
t,Y
  500 JSR osasci
  510 DEY
  520 BPL message
  530 LDA #0
  540 LDX #(block-of
fset) MOD 256
  550 LDY #(block-of
fset) DIV 256
  560 JSR osword
  570 BCC noescape
  580 LDA #&7C
  590 JSR osbyte
  600 BRK
  610 OPT FNequb(128
)
  620 OPT FNequs("Es
cape")
  630 BRK
  640 .noescape
  650 LDA #&80
  660 LDX #(filename
-offset)MOD256
  670 LDY #(filename
-offset)DIV256
  680 JSR osfind
  690 AND #&FF
  700 BNE fileopen
  710 BRK
  720 OPT FNequb(129
)
  730 OPT FNequs("Ca
n't open file")
  740 BRK
  750 .fileopen
  760 STA hand-offse
t
  770 JSR vector-off
set
  780 PLA
  790 TAY
  800 PLA
  810 TAX
  820 RTS
  830 :
  840 .close
  850 LDY hand-offse
t
  860 .closeall
  870 LDA #0
  880 JSR osfind
  890 STA hand-offse
t
  900 :
  910 .vector
  920 SEI
  930 LDA brkv
  940 LDX nbrk-offse
t
  950 STA nbrk-offse
t
  960 STX brkv
  970 LDA brkv+1
  980 LDX nbrk+1-off
set
  990 STA nbrk+1-off
set
 1000 STX brkv+1
 1010 CLI
 1020 RTS
 1030 :
 1040 .break
 1050 PHA
 1060 TXA
 1070 PHA
 1080 TYA
 1090 PHA
 1100 LDY #0
 1110 JSR closeall-o
ffset
 1120 PLA
 1130 TAY
 1140 PLA
 1150 TAX
 1160 PLA
 1170 JMP (brkv)
 1180 :
 1190 .output
 1200 PHA
 1210 LDA hand-offse
t
 1220 BNE isopen
 1230 JSR openfile-o
ffset
 1240 .isopen
 1250 PLA
 1260 BMI noprint
 1270 STY yreg-offse
t
 1280 LDY hand-offse
t
 1290 JSR osbput
 1300 LDY yreg-offse
t
 1310 JSR osasci
 1320 .noprint
 1330 RTS
 1340 :
 1350 .filename
 1360 :
 1370 ]NEXT
 1380 :
 1390 sum=0
 1400 FOR I%=0 TO &F
F
 1410 sum=store?I%+s
um
 1420 NEXT
 1430 IF sum<>&46F1
PRINT'"Checksum erro
r - please check lis
ting":END
 1440 PROCoscli("SAV
E V.ASCII "+STR$~sto
re+" +100 400 400")
 1450 END
 1460 :
 1470 DEF FNequb(byt
e)
 1480 ?P%=byte
 1490 P%=P%+1
 1500 =pass
 1510 :
 1520 DEF FNequw(wor
d)
 1530 ?P%=word MOD 2
56
 1540 P%?1=word DIV
256
 1550 P%=P%+2
 1560 =pass
 1570 :
 1580 DEF FNequs(str
ing$)
 1590 $P%=string$
 1600 P%=P%+LENstrin
g$
 1610 =pass
 1620 :
 1630 DEF PROCoscli(
string$)
 1640 DIM X% &FF
 1650 Y%=X% DIV 256
 1660 $X%=string$
 1670 CALL &FFF7
 1680 ENDPROC
```

Listing 2. Changes to be made to listing 1 to create the *ViewStore/ViewSheet* spooler. (NB: WIDTH = 24)

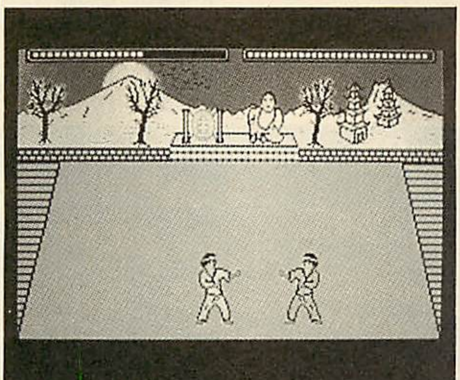
```
   10 REM Source for
Sheet+Store Spooler
 1251 PHP
 1260 BPL print
 1261 AND #&7F
 1262 BEQ htone
 1263 LDA #&01
 1264 .htone
 1265 ORA #&1C
 1266 .print
 1301 PLP
 1302 BMI noprint
 1430 IF sum<>&49A2
PRINT'"Checksum erro
r - please check lis
ting":END
 1440 PROCoscli("SAV
E V.VSXFER "+STR$~st
ore+" +100 400 400")
```

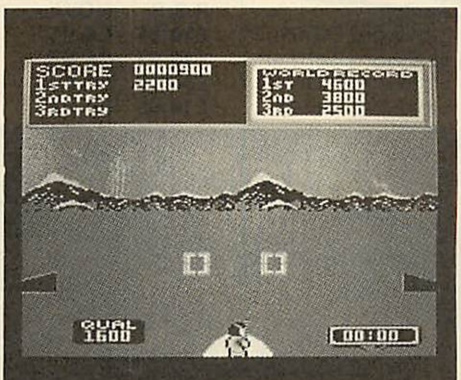
CHARTS

Check out the latest position of your favourite game

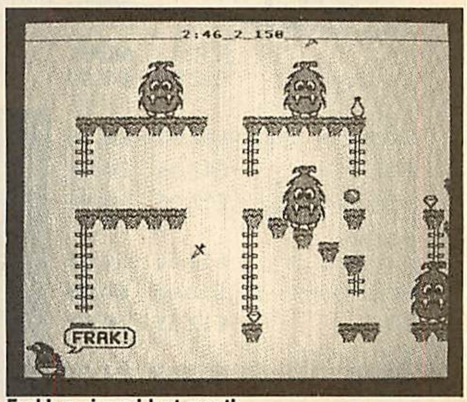
TOP 20 BBC MICRO GAMES

	Title	Publisher	Cassette	Disc	B+	Master	Reviewed
1	(–) Commando	Elite	£9.95	£14.95	*	*	–
2	(10) Winter Olympics	Tynesoft	£9.95	–	*	*	–
3	(11) Karate Combat	Superior	£8.95	£11.95	Yes	Yes	July '86
4	(19) Computer Hits 10 Volume 2	Beau Jolly	£9.95	–	Yes	No	–
5	(4) Phantom Combat	Doctor Soft	£9.95	£11.95	Yes	Yes	February '86
6	(5) Citadel	Superior	£9.95	£11.95	Yes	*	March '86
7	(1) Yie Ar Kung Fu	Imagine	£9.95	£12.95	No	No	March '86
8	(2) Way of the Exploding Fist	Melbourne House	£9.95	–	Yes*	Yes*	April '86
9	(–) Tennis	Bug Byte	£2.95	–	*	*	–
10	(3) Strike Force Harrier	Mirrorsoft	£9.99	£12.99	Yes	No	January '86
11	(17) Hyper Sports	Imagine	–	£12.95	No	No	May '86
12	(8) Lord of the Rings	Melbourne House	£15.95	–	*	*	–
13	(15) Computer Hits 10	Beau Jolly	£9.95	–	Yes	No	July '86
14	(–) Twin Kingdom Valley	Bug Byte	£2.95	–	*	*	–
15	(9) Repton 2	Superior	£9.95	£11.95	Yes	*	December '85
16	(13) Dambusters	Sydney/US Gold	£9.95	£14.95	No	No	–
17	(–) Bounty Bob Strikes Back	US Gold	£9.95	–	No	*	–
18	(–) Waterloo	Lothlorien	£9.95	£12.95	Yes	Yes	April '86
19	(–) Match Day	Ocean	£9.95	–	Yes	Yes	January '86
20	(–) Alien 8	Ultimate	£9.95	–	*	*	February '86


Karate Combat: high-kicking up the chart



Hyper Sports: still among the winners



Frak!: reviewed last month

TOP 10 ELECTRON GAMES

	Title	Publisher	Cassette	Disc	Reviewed
1	(8) Computer Hits 10 Volume 2	Beau Jolly	£8.95	–	–
2	(2) Way of the Exploding Fist	Melbourne House	£9.95	–	April '86
3	(3) Walk the Plank	Mastertronic	£1.99	–	–
4	(1) Yie Ar Kung Fu	Imagine	£8.95	–	March '86
5	(10) Thai Boxing	Anco	£8.95	–	–
6	(–) Commando	Elite	£9.95	–	–
7	(4) Computer Hits 10	Beau Jolly	£8.95	–	July '86
8	(7) Spectipede	Mastertronic	£1.99	–	–
9	(–) Frak!	Aardvark	£7.90	–	June '86
10	(5) Beach Head	Access/US Gold	£8.95	–	December '85

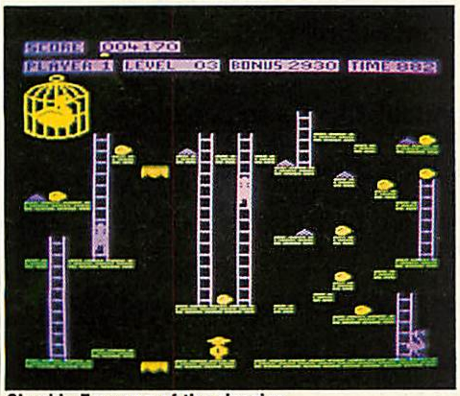
COMPILED BY GALLUP/MICROSCOPE

*PLEASE CHECK B+/MASTER COMPATIBILITY BEFORE BUYING

REVIEWS

GAMES

A JOLLY COLLECTION



Chuckie Egg: one of the classics

'Computer Hits 10 Vol 1', Beau Jolly, Electron and BBC B, £9.95

I suppose it's wrong to complain when you're offered 10 games for under a tenner, but when you've already bought one, two are virtually identical and two more aren't worth playing twice, you begin to wonder . . .

Computer Hits gets off to a flying start with *Chuckie Egg*, one of the classic games for the Electron and BBC micro.

For newcomers, the plot is simple – run round eight screens avoiding birds and collecting eggs, then do them again, but this time there's a big duck chasing you. Hilariously funny, incomparably addictive. 10/10.

Game two is *Ghouls*, a neat implementation of a standard plot. You have to find your way to the top of the screen, avoiding ghosts and spiders and the like, balancing on wobbly floorboards and moving platforms, jumping over deadly spikes, eating power pills, the 'just one more go' instinct given that extra edge by a wicked laugh from the ghost as each life is lost.

You really can't help taking it personally. It's funny, smooth moving, and frustratingly difficult. 8/10.

The third game is *Gisburne's Castle* – it's an arcade adventure which has potential that it doesn't fulfill.

As Robin Hood, you wander around Sherwood Forest and environs, attacking people and being attacked in turn, picking up stray objects along the way.

What annoys me, though, is that the game was so obviously written to run on the BBC micro, and not adapted in any way at all for the Electron.

It's the title page which is the dead giveaway – mode 7 double height characters on the Beeb; on the Electron, though, everything appears twice twice. I wonder if this is really a 'computer hit'? 3/10.

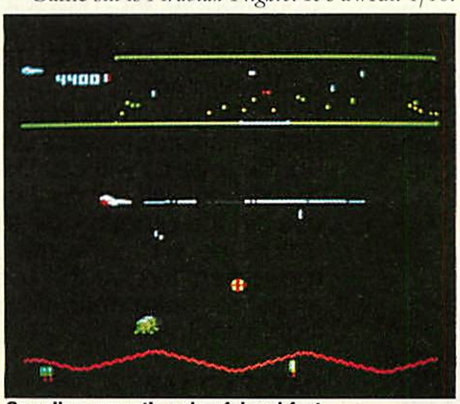
Game four is *Guardian*, an excellent implementation of the arcade classic, *Defender*.

It has a simple enough theme – you fly your plane as horizontally as you can, shoot at everything in sight, and rescue your pals if at all possible. Very smooth, colourful, fast and noisy. 8/10.

Special Operations from wargame specialists Lothlorien is the fifth game. It involves picking a team of tommies with a suitable balance of skills, parachuting into a forest (quote: 'The map is not accurate'!), then negotiating a safe passage through a total of 18 maps, trying to complete seven objectives.

This is a game which is sufficiently sophisticated to keep most wargamers out of the way for quite a while. 7/10.

Game six is *Arabian Nights*. It's awful. 1/10.



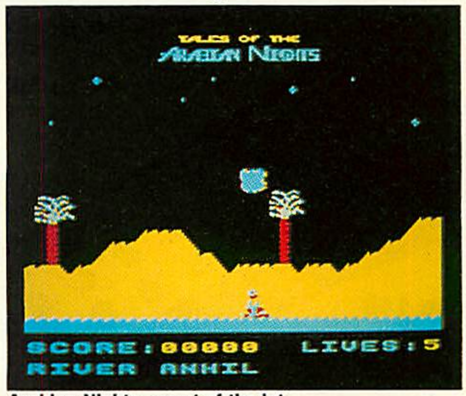
Guardian: smooth, colourful and fast

The seventh game is *Eddie Kidd's Jump Challenge*. This was a bestseller but I can't imagine why. The programming's fine, but I could only take so much of jumping over endless rows of vehicles. Still, it sold well, so someone must like it. 6/10.

Killer Gorilla, a routine version of a classic is the eighth game.

Here's the plot (sounds familiar?): you're this gorilla, trying to make your way to the top of the screen, collecting objects on the way, as nasty things do their utmost to impede your progress. It's certainly nothing original, just good clean fun. 6/10.

Game nine is *Night World*. Some like it,

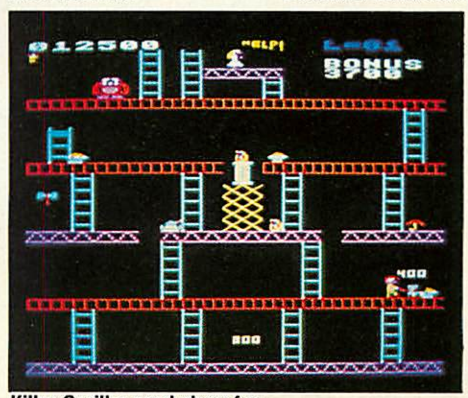


Arabian Nights: worst of the lot

some loath it. It's a genuine arcade adventure, in which you explore lots of underground caverns, and go round collecting things. In the daytime you're a mere humanoid, at night a mutant gargoyle, whose 'mysterious powers' mean you can jump further. I like it, but I'm thoroughly lost. 7/10.

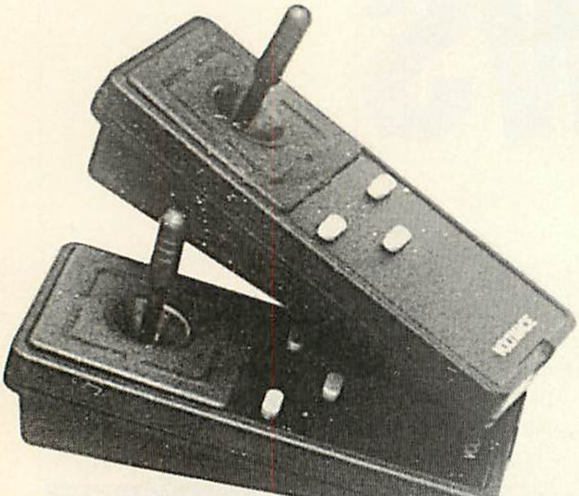
The last is the *The Gauntlet*, an excellent implementation of the arcade classic *Defender*. A simple theme – fly your plane horiz . . . yes, it's just like *Guardian*. What a cheek, putting them both in! But, as a game, it's just as good as *Guardian*. 8/10.

Computer Hits does contain a reasonably balanced selection of game types, and would provide an inexpensive introduction to computer games for the novice. Owners with an established collection could be tempted too, as will Beeb owners, since most of the games run as well as, or better, on the BBC micro than on the Electron. **Bernard Emblem**



Killer Gorilla: good clean fun

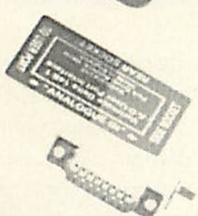
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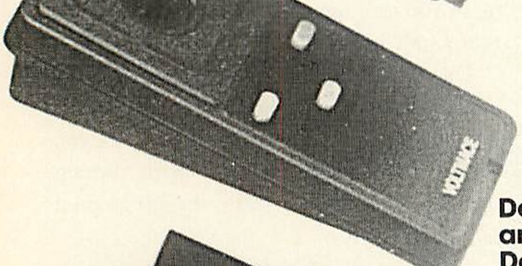
Delta 3B Twin



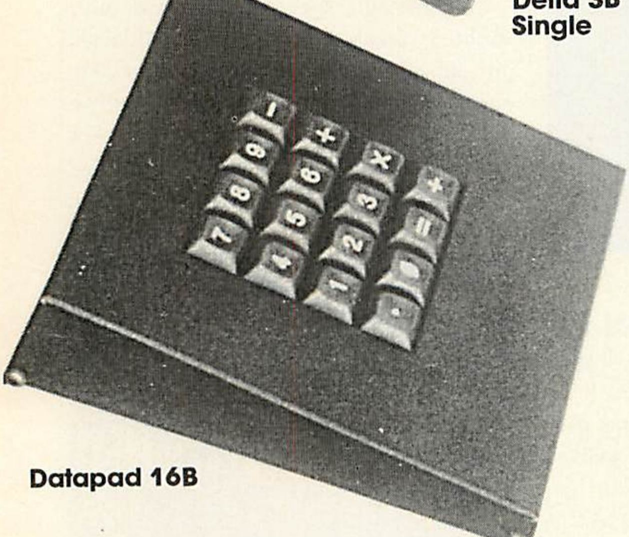
Delta 14B



Delta 14B/1



Delta 3S and Delta 3B Single



Datapad 16B

DELTA 3B TWIN—BBC B or ELECTRON PLUS 1 £19.95
A direct but improved alternative for the original ACORN joysticks, with 2 joysticks wired to one plug. As with all our joysticks they have the fast action sprung to centre return of the steel shafted nylon covered joystick. The light action makes them ideal to hold and the 3 fire buttons allow left or right-handed use.

DELTA 3B SINGLE—BBC B or ELECTRON PLUS 1 £12.00
A single joystick that in some ways can act as two. The custom made special "low noise" potentiometers are wired so that it will work as a left hand or right hand joystick. It can even run some programs written for two joysticks and has the fire buttons of both.

DELTA 14B—BBC B £14.95
Our original ACORN/BBC handset. The same super light joystick, but the long life buttons, which have been video game tested for many years, increased to 14 in number. A DELTA 14B/1 is needed to run the keypad but a 14B on its own will work as a joystick and fire buttons, so you can always add the 14B/1 to it later.

DELTA 14B/1 for use with 1 or 2 DELTA 14Bs £14.85
DELTA DRIVER CASSETTE £5.95
The A/D/USER PORT interface box. This gives simultaneous access to both the analogue port, for the joystick part and the user port, for the keypad. Two handsets can be plugged into the box giving a total of 24 user definable keys.
Full instructions are provided to include the keypad in your own programs even in BASIC or for the non-programmer a DELTA DRIVER cassette is available with keyboard to joystick/keypad conversions and keypad set up programs.

DELTA 3S (for ELECTRON with switch joystick interface) £12.00
For an ELECTRON with a switched joystick interface (Not a PLUS 1) this gives you the same delightful light, fast action of the DELTA joysticks but fitted with a 9 way D plug as per Atari, Commodore, etc. and will run on First Byte interface or similar.

DELTA ASC/B FOR BBC, DELTA ASC/E FOR ELECTRON PLUS 1
(not illustrated) **£9.95**
This little box plugs in series with your analogue joystick to alter its characteristics simply by using a switch. In one set up the joystick will act like a switched joystick, i.e. a slight movement will act as if the joystick has been pushed hard over. In the other mode the joystick only covers the centre half of the A/D converter so that it takes twice as much movement to give the same effect. This makes it much easier to make delicate adjustments to programs like flight simulators.

DATAPAD 16B £39.95
A commercial spec. 16 way keypad. Full travel mechanical keys with double shot moulded keycaps mounted in a low profile metal case. The keys are marked with calculator legend, but the software included allows the pad to be defined as any keys, including function keys or single byte VDU commands such as PRINTER ON/OFF. No tampering with the computer as it fits onto the user port.

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REVIEWS

GAMES / SOFTWARE

REVVING UP THE GAME



'Revs 4 Tracks', Acornsoft, BBC B/B+/ Master 128, cassette £9.95, disc £12.95

I didn't exactly get bored with the original *Revs*; it was such an entertaining and well-written piece of software that it kept my interest for months. But after tearing around Silverstone for the umpteenth time, I wished that some more circuits had been provided.

Now they have, in *Revs 4 Tracks*. Four more British circuits are in the package: Brands Hatch, Donington Park, Oulton Park and Snetterton, and for the money, you realise what a bargain you've got.

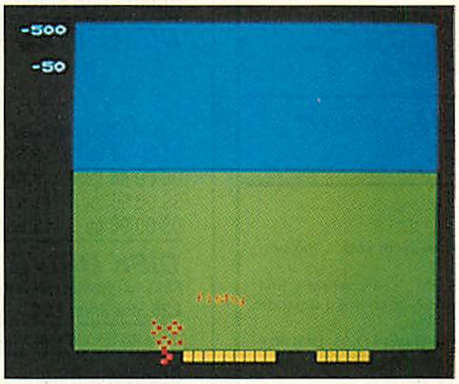
As you load in the Brands Hatch circuit, force of habit tends to make you trim the front and rear wings to their optimum Silverstone setting, and after skidding at the first couple of corners and crashing into the fencing you realise that the wing settings are totally wrong for the circuit. I found that the best solution was to take a quick demotion to novice class, set the wings for the slowest speeds and creep along in second or third gear. I recommend that you do this for each of the other tracks because they are very much harder to get to grips with than Silverstone, which was a very fast circuit with long straights and few corners.

This new collection, although seemingly as fast, has shorter straights, trickier corners and a new test of skill and courage – hills! The fact that the track surface disappears from view and your steering wheel outlines itself against the sky is one good reason to go slowly at first. A novel feature is the built-in power steering which operates automatically when negotiating one of the hairpin bends. It just saves you having to press the spacebar to assist the turn.

All in all, an excellent value-for-money package. You will, of course, have to own the original *Revs* in order to run *Revs 4 Tracks*. Perhaps, soon, we can look forward to some international circuits, or maybe, with the extra memory of the 128 Master series, an enhanced version with grandstands or bridges.

Peter Clements

TEST YOUR TYPING



'Type Invaders', Carswell Computers, BBC B/B+/Master, £7.50 (cassette), £12.50 (disc), £25 (Econet disc)

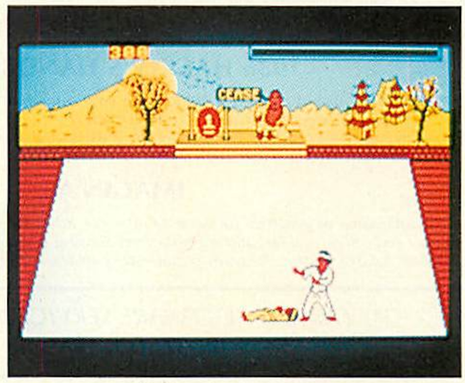
Learning your way around the micro's keyboard can be a tiresome business. So anything which helps the learning process and gives a bit of fun is to be commended. This simple program has you bashing at the keys, trying to destroy letters and words which 'attack' you from the top of the screen. Hit the right key and the invading letter will disappear.

It's a ludicrously simple idea, but very well thought out. There are 10 levels of play: at the easiest, you have only to deal with capital letters on one line of the keyboard; at the toughest, you're attacked by capitals, lower case and figures, as well as a motley collection of four- and five-letter words. At each level you can choose between four speeds of play, from slow to frantic. Each session lasts three minutes – a great test of concentration – and at the end you can enter your score and your name in a hi score table.

Graphically, it's a pretty primitive mode 7 affair, and the sound doesn't amount to much (just a squelch when you destroy a letter), but that doesn't matter. This isn't meant to compete with arcade action games. At its simplest, it can be played by very young children who've only just learnt the alphabet. At its hardest, it's a tough test for even an experienced touch-typist. A nice idea, well executed and especially valuable, I would have thought, in the classroom.

Jeffrey Pike

COMBAT CONFUSION



'Karate Combat', Superior Software, Electron/BBC B/B+/Master, £8.95

Full marks to Superior Software on some counts. They've provided two versions of the game, and the Electron version is compatible with First Byte and Plus One-type joysticks. The instructions are both detailed and helpful.

And so to the game. I've long awaited a decent two-player game on the Electron and this one offers a practice mode against a punchbag, a competition mode against 13 computer controlled opponents, as well as a two-player option.

Martial arts keys can be something of a handful; here they're plentiful but sensibly arranged, requiring the use of three fingers on each hand, plus a thumb to bang a turn key. The six controls are up and down, left and right, hands and feet, with combinations providing reasonably predictable results, such as up and feet for spectacular flying kick, or down and hands for a nasty low jab.

So far, so good. Unfortunately, I found the game a disappointment as it contained a fatal flaw – I couldn't tell what the Kung Fu was going on. The sound effects, which are apparently meant to show who's just clobbered whom, are meaningless feeble bleeps. The energy levels don't help much either, since I found myself doing more damage to me than to my opponents, being constantly penalised for attacking thin air.

So, was it just me? I don't think so, as I loaded it in to a borrowed Beeb. There I found a superior version of the game which gave a clear audible signal each time a blow landed.

In my experience most Beeb games make relatively uneventful journeys to the Electron, but here's one which has lost a lot in the translation.

Bernard Emblem

SOFTWARE

PROCEDURAL PROGRAMMING



'Proc-Kit', Software Servcices, BBC B, £10.95 (disc)

Here's a useful tool for programmers, a disc-based management system that helps you build up a library of procedures and functions for insertion into your programs.

You can assemble your library by writing new PROCs or FNs, or by lifting them out of an existing program and saving them on a data disc. It's claimed that up to 255 procedures can be saved on a single disc side. Just to get you started, the software already contains 40 resident procedures, and they're a pretty useful selection – simple sound effects (handy for games), simple graphics (circle, ellipse, etc), text routines (double-height, shadow effect, etc), short cuts for defining graphics and text windows, sorting routines, and some which are more like self-contained programs, such as the one which gives you the day of the week



for any date, any year. Most useful of all, perhaps, is a machine code procedure called 'overlay', of which more later.

So you've acquired a library of procedures on disc – now what? *Proc-Kit* enables you to load any PROC into an existing program without disrupting the program, ie, it automatically makes any necessary alterations to TOP, LOMEM, line numbers, etc. Handy. Best of all, if you include PROCoverlay, it can call a succession of procedures from your data disc while the program is running, thus increasing the potential length of your program. In effect, this means that, according to the capacity of your drive, you can write and run programs of nearly 100k, 200k or even 400k on a simple old 32k BBC B. Now there's a challenge.

The whole system is menu driven, doesn't seem to allow much room for mistakes, and is all fairly self-explanatory. Which is more than can be said for the documentation. Perhaps I've only seen a provisional version – two pages of grubby close-packed type – but it didn't help me much to understand what *Proc-Kit* can do. It's a tribute to the writing of this software that you can learn faster simply by using it.

Jeffery Pike

FACILITIES FOR MANAGEMENT



'BeebMan', Slogger Software, BBC B/B+, £17.50

It's always seemed rather odd to me that Acorn designed the operating system of the BBC micro to cope with up to 16 sideways ROMs, and then only provided space on the main circuit board for five. Even the 'improved' B+ only allows for six (and there aren't many 32k ROMs kicking around). Most users who want to take advantage of the convenience of ROM software will therefore opt for an add-on ROM board. Once this is getting well populated, they may well be in the market for one ROM to manage the other 15.

Slogger Software would have you consider *BeebMan* for this function, and it certainly offers most of the facilities you're likely to be looking for. It's probably safe to assume that anyone wanting a ROM management chip will know how to fit one, and, once installed, you can call up a help menu or read the 21-page manual to find out more about the 16 new '*' commands provided.

The manual is well written and clearly set out. It includes separate sections on abbreviations, commands, delimiters, etc, which are often skipped over, or omitted from the software altogether. You can abbreviate all *BeebMan*'s commands to two or three letters and use any one of the characters ! " £ $ % & ' ( ) * + , – . or / as delimiters. This may seem a luxury, but you aren't likely to hit a wrong'un and you can use quotes to delimit ROM names with a space in them (such as "DISK MAN" or "WORDWISE PLUS").

The commands themselves allow you to display information about each ROM, to disengage or 'kill' any ROM, and to shift ROM images to sideways RAM (and hence to tape or disc) and back again. In addition, the ROM includes a hex dump, a multi-character 'poke' command and a function key editor.

The two levels of ROM disability are *OFFROM and *KILLROM. The first of these prevents clashes between ROMs which offer different commands under the same name. The second removes the ROM electronically from the micro, so that the MOS won't recognise it. Both methods of disabling ROMs may be reversed by the *ONROM command.

It's a shame these facilities weren't combined with the ROM status display, which shows which ROMs are in the machine, their lengths and whether they are disabled or not. It would have been nice to be able to move a cursor around the display and select or deselect any ROM from there: *BeebMan* seems fond of splitting functions in this way.

There are two function key commands, *PKEY and *KLIST. The first prints out the ASCII strings attached to each key and the second displays whether the key is in use or not! I would have thought the first display makes the second redundant.

Each ROM controlled by *BeebMan* can be sent a command directly, by prefixing the command with the ROM's name or number. Thus to send a *FORMAT command to your *Floppy Wise* ROM in socket 12 you may type *FORMAT 0 80 FLOPPY WISE, or *FORMAT 0 80 R12.

BeebMan seems to provide most of the facilities you would want from a ROM manager, but some are carried out in a rather convoluted way.

Simon Williams

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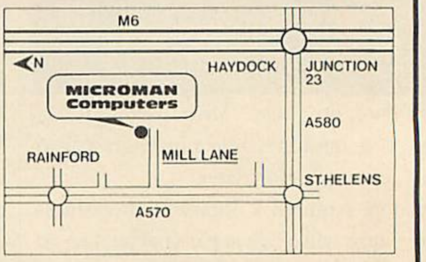
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REVIEWS

SOFTWARE/BOOKS

HOW TO GET INSIDE INFORMATION

'Inside Information', BBC Soft, audio tapes £6.95; book £8.95; software £12.95

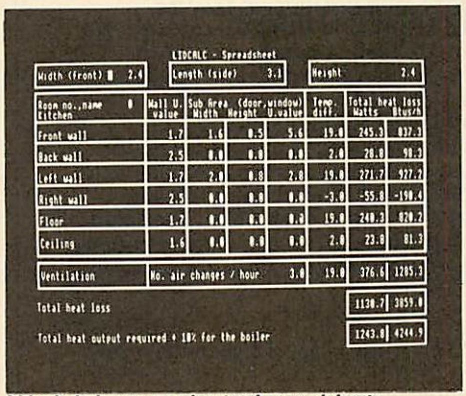
The idea behind the *Inside Information* pack is not totally new: others have already tried to give an overview of the impact of modern technology on our society, culture and business and industrial practices. None has perhaps attempted to attack the topic from so many points of view, however.

There are several reasons for this – first, not all lecturers (this is aimed at further education colleges) will necessarily wish to use all aspects of the material. Second, it's capable of being received on a number of levels. If the message does not get through at the first attempt then perhaps a new tack will cause the penny to drop. Third, the pack is offered as a component of the City and Guilds of London Institute course, number 444, Inside Information.

Part of the course involved a radio broadcast and two C60 audio cassettes are available containing an edited version of the radio programmes, introduced by the excellent Paul Heiney. These cover topics from databases, through communications, the electronic office and computer-aided design to computer control in cameras and aeroplanes, artificial intelligence, expert systems and robots.

I found them interesting and provocative in many ways. These would provide useful jumping-off points for discussion, used in the small five-to-10 minute sections which are recommended by the guide.

To accompany the programs there is a parallel book, again entitled *Inside Information*, by Jacquetta Megarry who, among other things, writes for *Acorn User* and the *Times Educational Supplement*. The book, over 200 pages including a substantial and very lucid glossary, is of the type that young people thoroughly enjoy – high quality pictures backed up by clear and concise text giving an overview very reminiscent of the Time Life scientific and natural history publications. It covers the whole gamut of microtechnology applications in a superficial, though not a trivial, fashion. This approach whets the appetite and encourages the reader to delve deeper into the subject. The book on its own can be recommended as essential reading for any would-be technologist from about 13-years-old upwards.



Lidcalc helps you understand spreadsheets

Further back-up to all this is provided by the software which aims to take the lid off the computer and help the student understand some of the processes involved in spreadsheets, databases, wordprocessing and computer control – hence the program titles of *Lidoff, Lidtext, Lidcalc, Liddata, Lidbase* and *Lidturn*.

The first of these I thought was rather complex for an introduction. Its intention is to show the stages by which the computer decodes its instructions and acts upon them: it's possible for the user to enter a simple program and see the way in which the computer handles the various commands. Input, processing and output are all dealt with but I'd rather have seen this last aspect dealt with later. Nonetheless, it's entirely up to the user which program they use first.

Lidtext provides a fascinating insight into the mechanisms of wordprocessing. The user may edit text or command the computer to perform functions which are then clearly visible on the screen.

This rather startling facility causes the text and the cursor to dance around the screen until formatting, justification and general editing are complete. The demonstration program would be suitable in a wide variety of situations in colleges and schools.

In a similar way, the student is brought to a simple understanding of the basic principles of spreadsheets in the *Lidcalc* program. This is based on a central-heating exercise for a house, changing variables such as building materials, size of rooms and air change rates.

Lidturn provides a demonstration of the ways a computer may control a piece of machinery – in this case a lathe which is represented graphically on screen. A program of commands will cause the lathe to create shapes on the 'material' on screen and the process may be varied to discover the effect on the end-product.

Finally *Liddata* and *Lidbase* provide introductions to information handling, searching and sorting in a simple and efficient way.

This pack, which provides so many avenues of approach to the same areas, will be of great value in colleges of further education. My guess is that sections of it will begin to appear in other areas of education as well since the style and presentation would suit all ages from about young teenagers upwards – this, tied in with it also being part of a City and Guilds Certificate, seems to ensure that it will be widely used. Well done, all concerned!

Nick Evans

MASSES OF MATHS

'Maths Tutor for the BBC/Electron', Robert Carter, Century Communications, £7.95

Sooner or later, most programmers come across a problem that requires a knowledge of maths, and wish that they could remember more of their school maths. This book should provide the answer to their needs. Its appeal should also extend to people with limited mathematical ability who wish to know more, to pupils studying maths, and to teachers wishing to illustrate mathematical principles and techniques.

This is quite a long book – over 250 pages. Most of the mathematical topics covered are illustrated with one or more short program listing – each about 10 lines long. There are 101 of these programs, all of which work on either the Beeb or the Electron.

There is plenty of depth to the material, and some of the topics covered are: types of numbers, operators, powers, roots, functions and graphs, trigonometry, polynomials, polar co-ordinates, complex numbers, series, vectors, matrices, differentiation and integration and some statistics. A useful touch is a series of user-defined graphics definitions covering most of the common mathematical symbols.

The style of the book is very informal and easy to read, and the programs support the material well. There are no tedious end-of chapter exercises, and, sadly, there is no index. This is one of the few maths books I have enjoyed reading, and it will be a welcome addition to my collection of reference books.

Martin Phillips

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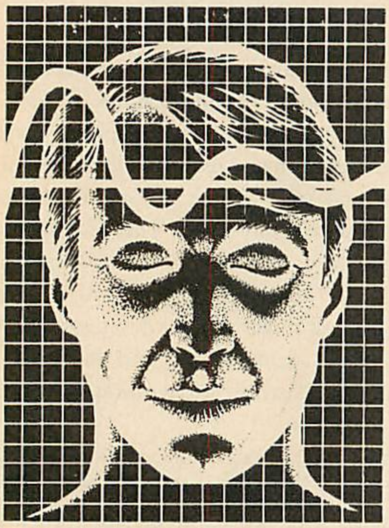
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HARDWARE

A QUESTION OF CONTROL

Richard Sargent experiments with interfaces to control the outside world



Interfacing the BBC micro to control devices is often said to be easy because of the wealth of bus and I/O ports. This is only partly true: the Beeb has a clear advantage over other computers less well endowed with I/O facilities, but you still need a robust and powerful box-of-tricks between those delicate CPU signals and the 4, 9, or 12 volts drawn by the hi-tech motorised pencil-sharpener you've just invented.

DCP Computer Interfaces has recently extended its range of products by introducing an Intercard system. Now it offers Interpack 1 (which has essentially the same facilities as the Interbeeb and with which many Beeb users will be familiar), and Interpack 2, a digital-to-analogue pack and an analogue-to-digital pack. These packs now work with five popular computers, providing that the appropriate 'personality' module is clipped onto the interface. This, says DCP, lowers manufacturing overheads and the money saved is passed on to the user. It also allows you to change your controlling computer – if you have Interpack 1 up and running on a Commodore 64, for example, it will cost £21.70 to buy the Intercard for the Beeb. DCP is not suggesting that such changes should be made on a daily basis, since the Intercard socket tends to become very loose if used too frequently.

Interpack 1 is a multi-purpose interface. It runs from the Beeb's 1MHz bus and has its own +5V power supply, of the type which has the transformer incorporated in the mains-plug. The interface Printed Circuit Board (PCB) and connectors are all housed in a neat black box and clearly labelled with connector legends. Eight ADC channels, four relay-buffered outputs and four switch-inputs are available on sockets which take standard 2mm laboratory plugs, while a further eight TTL inputs and eight TTL outputs are provided on standard 0.1in header-sockets. A final connector, designated the DCP bus, allows other DCP products to be plugged into Interpack 1.

PHOTOGRAPH BY PAUL DUNN

The documentation is very clear and plenty of diagrams are given to help in setting up your I/O experiments. There is no software as such, but the port addresses are given (&FCC0-&FCC4 inclusive). The logic used is the natural active-high convention, so writing ones to a port turns something on. Note that, since the DCP's product runs on the 1MHz bus, the Beeb's own I/O port is available for other control duties.

This is a well-made peripheral which is simple to use. My only reservation is that the four relays, which have 1Pole-1Way contacts, are commoned together in such a way as to provide five rather than eight outlets and their ability to control automatically some circuits will thereby be restricted. In such circumstances, Interpack 2 with its six 1Pole-2Way relays and eight switch-inputs might prove a more suitable I/O for your needs.

Pilot One produces both hardware and software for I/O applications. Its largest interface is simply called the output unit 511/OU. It plugs into the Beeb's 1MHz port and connects to the outside world using the 4mm sockets which accept banana plugs. A transformer built into the case delivers +5V at a generous 1Amp. The basic interface has eight relay-buffered output lines with green LEDs which mimic the logic state of each individual output line. An extension socket with pin-outs identical to the Beeb's own I/O port allows extra Pilot peripherals to be plugged into 511/OU. An eight-channel optically-isolated input unit (512/IU) and a four channel ADC unit (801/AP) can use either the Pilot I/O socket or the Beeb's I/O port.

Alternatively, Pilot's IN/521/E interface will provide input-output to the same specification as 511/OU and 512/IU, but with only four relays and four inputs and no extension socket.

Pilot uses 1Pole-2Way relays on all its peripherals, and brings all the relay contacts out to the 4mm sockets, which is very useful. Even more useful to experimenters are the Pilot software routines designed to drive the peripherals. A neat package of Basic procedures appropriate to the interface purchased is supplied on tape or disc.

Pilot's hardware is rugged and well-built, and its handbook informative and useful. Its advanced software control packages are worth investigating if you haven't got the time to write your own.

Interpack interfaces by DCP Microdevelopments are available from Commotion, 241 Green Street, Enfield EN3 7SL. Tel: 01-804 1378.

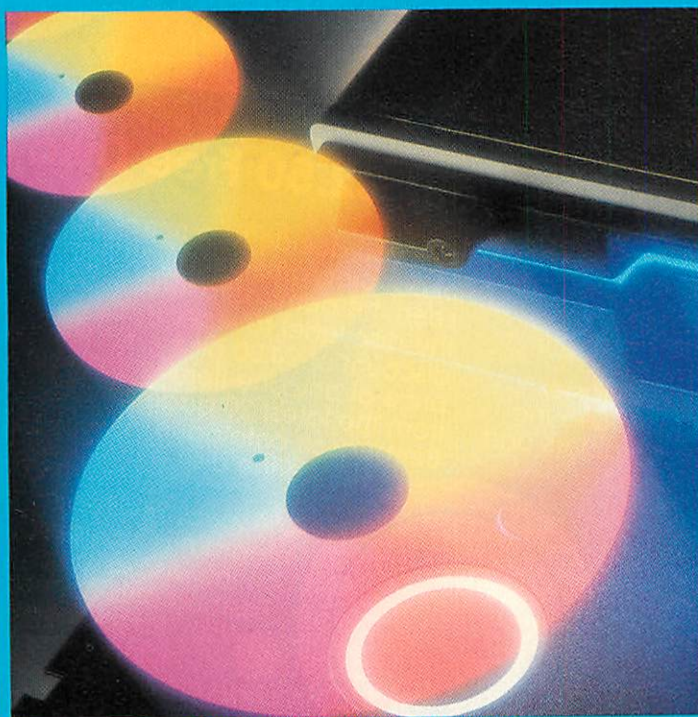
BBC Intercard	£21.70
Interpack 1 (requires Intercard)	£43.43
Interpack 2 (requires Intercard)	£34.74
ADC Pack	£21.70
DAC Pack	£21.70

Pilot interface and software are available from Pilot One Ltd, 22 Campbell Road, Bedford MK40 3DD. Tel: (0234) 327688.

IN/521/E (four outputs four inputs)	£70
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512/IU (eight inputs)	£40
513/AU (ADC)	£40

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ACORN USER


Tour the world of discs: see page 146

GUIDE TO DISCS

The 1770 revealed
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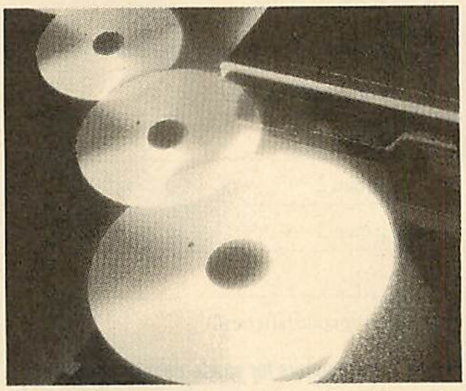
David Atherton delves into the 1770 disc controller and its OSWORD calls

The disc controller chip fitted to the BBC B+ and Master is a Western Digital 1770 device, different from the Intel 8271 controller on the original BBC micro. Acorn substituted the 1770 because the 8271 was becoming scarce, and therefore expensive, and also it could not support double-density recording. As most discs and drives support single- and double-density, the same units can be used with a 1770 system as are used with earlier BBC micros. Also, the 8271 requires a number of support chips for data separation which the 1770 does not, as you will find if you compare the chip count of each upgrade kit.

So, how does the 1770 controller differ from the 8271 as far as the programmer is concerned? This depends on whether you want to use it for single- or double-density operation, and at what level you use it. In single-density, the chip behaves in a very similar way to the 8271, and discs are interchangeable between the two controllers. The double-density format is completely new to BBC micro users, but the operating principles are very much the same.

There are three levels at which you can manipulate data on a floppy disc. The first is through the full operating system using catalogue names, file names, and all the powerful routines such as BGET, ACCESS, OSFILE, etc, in your programs and in direct mode. These might be programmed for you, ie, from an applications package, or coded yourself using Basic and '*' commands, or in assembly language. These methods allow full use of the features of the operating system (OS) and disc filing system (DFS or ADFS). This level is filing system independent – so the same principles apply to, say, networks or RAM discs, but you are tied to restrictions imposed by the filing systems such as limited catalogue entries.

The second level is to use OSWORD calls to access the disc directly. This is the level I'll look at in detail. A third, even lower level involves actually writing direct to the disc controller chip, and creating your own routines for timing and data translation. This



last method involves writing directly to the disc controller chip, using no intermediate firmware, and this is, of course, how the DFS ROM itself does its job.

The OSWORD call level is unlike the higher commands in that you are dealing with tracks and sectors, not with files, catalogues and directories. For normal applications programs you would not usually work at this level, but on the other hand, if you can't live with 31 files per disc, or you want every inch of disc and memory space, then direct sector access can be very powerful. The lowest level is interesting and necessary if you don't want to use the DFS ROM. However, the amount of code needed at this level to perform even simple tasks such as 'load a sector' means that it's rarely worthwhile doing it yourself when the 1770 DFS is present.

Single/double density

The 1770 chip is quite flexible, and allows many different data formats to be used. The two that the BBC micro uses (under Acorn firmware) are 10 sectors per track, recorded in single-density; and 16 sectors per track in double-density. In both cases, sectors are 256 bytes in size, sequentially numbered, on correctly numbered tracks. Bad tracks and deleted data are not used. There are 40 or 80 tracks, depending on drive hardware. If these formats are not used, the DFS or ADFS at top level cannot read the discs.

When using a 1770-based BBC micro, OSWORD &7D to &7F are used to access data recorded in single-density format. This means a call to OSWORD (&FFF1) with A set, say, to &7D, and X and Y pointing to a

Hex	Command	1770?	Parameters
4A	Write 128 bytes	Yes	A
4B	Write multi bytes	Yes	B
4E	Write deleted data 128	Yes	A
4F	Write deleted data Multi	Yes	B
52	Read 128 bytes	Yes	A
53	Read multi bytes	Yes	B
56	Read deleted 128 bytes	Yes	A
57	Read deleted Multi bytes	Yes	B
5B	Read sector IDs	Yes	C
5E	Verify 128 bytes	Yes	A
5F	Verify Multi	Yes	B
63	Format track	Yes	D
69	Seek track	Yes	E
6C	Read drive status	Part	
75	Init. 8271	Part	
75	Load bad tracks	Part	
7A	Write special register	Part	
7D	Read special register	Part	

Table 1. List of disc controller commands

parameter block in the usual OSWORD way. These OSWORD calls are supported in the 1770 DFS ROM, and if this ROM is not present, the calls won't work. Also the DFS should be selected (by *DISC) although in practice the calls will work if, say, the tape filing system is selected.

With double-density format discs a different set of calls – OSWORD &70 to &72 – are used. The code to service these calls is in the ADFS ROM, which must be present for the calls to work. Also, Acorn says in the ADFS manual that the calls may fail if ADFS is not the currently selected filing system.

Single-density commands

The command format of OSWORD &7D-&7F is identical to that on the old DFS for the 8271. The calls all require the standard OSWORD format as detailed above.

OSWORD &7D: Read write count (times disc has been written to. This is the number shown after the title in the catalogue display.)
Entry: A + &7D, no parameters.
Exit: Byte at XY contains write count (in BCD).

OSWORD &7E: Read disc size.
Entry: A = &7E, no parameters.
Exit: Word at XY+1, XY+2 contains number of sectors on disc.
This will return 400 for a normal 40-track disc, or 800 for 80-track, ie, 10 sectors per track. Note that the bytes start at XY+1, not XY. Both these calls have a useful side-effect of calling the DFS catalogue sectors into memory. Track 0, sectors 0 and 1 are transferred into memory at &E00 to &FFF (&C000 to &C1FF on a Master). The information is taken from the catalogue sectors, so if the catalogue is not standard, the returned values will be meaningless.

OSWORD &7F: Disc controller commands.
Entry: A=&7F, XY points to parameter block.
Exit: Action performed. Error in XY+n (0=ok), where n is 7+?(XY+5).
The parameter block is set up as shown in figure 1.

See table 1 for a list of the various disc controller commands. The codes used are actually 8271 hardware codes. The 1770 DFS ROM performs translations to the 1770 equivalents. The commands coded &4A to &69 in table 1 are the important ones. These read, write, format, and verify, and are all emulated on the 1770 DFS. The other commands are only partially emulated as the 1770 does not have the same features as the 8271. However, the emulations needed to cope with routine software protections such as different logical and physical track numbers, are provided.

Note that the calls work in 128-byte sectors or 'multi' sectors. 'Multi' means any other sector size, such as the DFS standard 256-byte sectors. In parameter type B, the third parameter is calculated by setting the top three bits to n where 128 x 2^n is the size of the sector in bytes, and setting the bottom five bits to the number of sectors per track. In the standard format of 10 256-byte sectors per track, this value will be &2A.

0	drive number
1-4	memory buffer
5	number of parameters after command
6	command (see table 1)
7	param 1
8	param 2
9	param 3
. . .	
n	error code (after call)

Figure 1. Parameters for single-density commands

The parameter format for the OSWORD &7F group of commands is given in table 2. The bracketed number is placed in XY+5, and the named parameters are entered from XY+7 onward. So for command &4A (write a 128-byte sector), XY+5 is set to 5; XY+6 to &4A; XY+7 to the track number and XY+8 to the sector number. Any error during the call is placed in XY+9 on return.

Double-density commands

There are four OSWORD calls provided by the ADFS ROM for use with double density formatted discs.

OSWORD &70: Read status information.
Entry: A = &70, no parameters.
Exit: Byte at XY contains master sequence number, a count of write operations to that directory. Byte at XY+1 is a status byte indicating presence of Tube, Winchester, etc.

OSWORD &71: Read free space.
Entry: A = &71, no parameter.
Exit: Bytes at XY to XY+3 contain 32-bit number of bytes free on the current drive under ADFS. This call is similar to *FREE.

OSWORD &72 : Read/write data.
Entry : A=&72, parameters as shown in figure 2.
Exit : Transfer effected. See OSWORD &73 to test for errors.
The parameter block is set up as follows:
Function codes: The only documented codes at present are &0B (read) and &0A (write).
Disc address: The 'relative sector' number which is the track number times 17 plus the sector number.

0	0
1 2 3 4	Memory address of start of data to be read/written
5	Function code (&00-&1F)
6 7 8	Bits 5-7 drive no. Bits 0-4 MSB of disc address Disc address Disc address (LSB)
9	Sector count (if 0 use bytes 11-14)
10	0
11 12 13 14	Data length in bytes (Ignored if byte 9 is non-zero).

Figure 2. Parameters for reading or writing

OSWORD &73: Reports errors.
Entry: A = &73, no parameters.
Exit: Any errors are shown in the parameter block, as see figure 3.

Using the calls

To keep things simple I will look at the standard disc formats mentioned above. If you want to experiment with other formats, particularly in single-density, then there are two very thorough books available, *The Advanced Disk User Guide* by Colin Pharo published by the Cambridge Microcomputer Centre at £14.95 and *Mastering The Disc Drive* by Chris Snee,

0 1 2	Disc address where error occurred. LSB in 0, MSB in 2, bits 0-4. Drive no. in bits 5-7
3	Disc error number
4	Channel number of file where error occurred. If byte 4 >0, then 3 is invalid

Figure 3. Parameters returned by OSWORD &73

Parameter formats (number of parameters)		
A	(2)	track, sector
B	(3)	track, sector, no/size of sectors
C	(3)	track, 0, no of IDs (1-10)
D	(5)	track, gap 3, no/size of sectors, gap 5, gap 1
E	(1)	track

Table 2. &7F command summary

published by BBC Publications at £7.95 (both reviewed on page 154). These books are written around 8271 systems, but because of the excellent emulation provided by the 1770 DFS, the routines in them will, in the main, work correctly on a 1770 system.

To demonstrate the most important operation – actually transferring data to and from a disc – I have written a short demonstration program (listing 1 on the yellow pages). This merely writes &600 bytes-worth of test data to and from single- and double-density discs. The listing centres around a procedure which will read or write a number of sectors to or from a block of memory in both single and double density. The procedure, PROCsectors, takes six parameters:

mem% – the start of the memory block that bytes will be transferred to or from.

stsec% – the first 'relative sector' involved on the disc.

nosec% – the number of sectors. This determines the size of the transfer.

dr% – the disc drive number.

dblden% – a flag set TRUE for double-density operation, FALSE for single-density.

write% – a flag set TRUE for write operations, FALSE to read.

There are really two completely separate routines within the procedure, depending whether single- or double-density operation is required. In single-density, OSWORD &7F (read/write multi-sector) is used, and the 'relative sector' is converted into track and sector numbers. Byte 10 of the parameter block will contain any error, and this is reported. As this OSWORD call can only read/write up to 10 sectors at once, a check is made and if there are more than this, the routine is stopped.

For double-density the OSWORD &72 read/write data routine is used only in the sector count mode, ie, parameter bytes 11-14 are ignored. The 'relative sector' and number of sectors is passed straight to the OSWORD routine. The drive number is passed to byte 6 – note that for this to work like DFS, drive 0 must be currently MOUNTed. This is because OSWORD &72 does a logical OR of the drive number supplied with the current mounted drive. Also this procedure assumes that there will never be more than &FFFF sectors – a fair assumption with floppy discs.

After the transfer, a call is immediately made to OSWORD &73 to check for errors. If the parameters are anything other than &00 or &FF, the error is reported.

The procedure has been designed to be fairly general-purpose, and could form the basis of a disc sector editor or recovery program.

For David Atherton's listing, see the yellow page index on page 113

DISC JARGON

ADFS: Advanced Disc Filing System – a hierachical filing system that allows discs to be used in double density mode.

Architecture: The disc architecture is the way (sequence) in which the data is stored on the surface of the disc.

Directories: Files may be grouped together in directories. In DFSs directory is specified by prefixing the filename with a letter and a dot. For example, *View* files could be stored in the V directory by typing SAVE"V.TEXT1". Loading from directories is performed in a similar way. In ADFS, directories may be given names and these directories may also contain directories, thereby giving a hierarchical structure.

Disc: A magnetic medium onto which data can be stored with a disc drive. They come in either 40 or 80 track formats and may be double sided or single sided. In reality all discs are exactly the same, but 80 track discs have been tested for reliability whereas a 40 track disc has only been tested for reliability on 40 tracks.

Disc controller: A special chip that the Disc Filing System programs to control the disc drive. On a BBC micro this is an 8271 chip; on the BBC B+, Master and Electron it is a 1770.

Disc Filing System: DFS for short, this is the ROM which contains the software for all the extra disc commands.

Disc interface: The collection of chips fitted inside your micro which allows it to read from and write to the surface of a disc.

Double density: Allows nearly twice as much data to be stored per disc, typically 640k. The ADFS must be used for this method of operation.

Dual format: A disc which can be read by both 40- and 80-track drives. Often an 80-track program is included which instructs the disc drive to double-step, and so behave like a 40-track drive.

Flippy: A new style of disc for use by owners of single sided disc drives where both sides of the disc may be used simply by flipping it over.

Formatting: Before use, a disc must be marked electronically into a series of tracks and sectors thus enabling the DFS to find its way around the disc surface. This marking is performed with a *FORM or *FORMAT command, normally present in the DFS or on a separate utilities disc supplied with the disc interface.

Hard disc: A complete unit incorporating the drive and a non-removable disc, which spins continuously. Very fast data access rates and high capacity (often measured in megabytes) are typical of hard drives.

Head: Rather like the stylus on a record player, the 'head' is situated on the disc drive and reads information from or writes it to the disc surface.

Library: A directory or disc number may be specified as the library, which can contain files that are needed regularly. If the DFS cannot find the specified file in the current directory it will look in the library directory for it.

PSU: Power supply unit. This is essentially a transformer which converts mains power into a suitable power supply for the disc drive. Some drives take their power straight from the BBC micro instead.

RAM discs: An area of memory – usually completely separate to the computer's main RAM – which acts like an extremely fast disc drive. However, in some cases the contents are not retained when the power is switched off and so the RAM disc must be backed up on to a normal disc when you want to finish working.

Sector: These are electronically marked segments on the surface of a disc. There are 10 sectors on a single density disc, 16 on a double density disc, each capable of holding 256 bytes of data.

Single density: Standard DFS storage capability, 200k per side on an 80 track disc, 100k per side on a 40 track disc.

Switchable: Disc drives are normally either 40 track or 80 track only. Switchable disc drives are now common and allow you to select which track density you want by the flick of a switch.

Tracks: These are concentric circles on the surface of a disc on to which data is written. Discs are either 40 or 80 track.

1770: The disc controller chip used on the BBC B+, Master and Electron. Supports double density.

8271: The disc controller chip fitted on a BBC micro. Discontinued on subsequent versions of the BBC micro due to the high price and lack of double-density operation.

Write protect notch: A notch cut into the edge of a disc. Using a light beam and photocell the disc drive determines whether this notch is covered (stickers are usually provided with discs for this). If it is, no writing/erasing can be done – a useful way of preventing accidental erasure of files.

A DRIVE AROUND DISCS

Bruce Smith and Tony Quinn are your guides in this tour of what's available in the world of discs and drives

The very first issue of *Acorn User* back in July 1982 contained just one advertisement offering disc drives – £235 for a 100k drive and £389 for the dual version. Ouch! However, we've come a long way since then, and for the same £235 you'll get drives with 800k storage capacity.

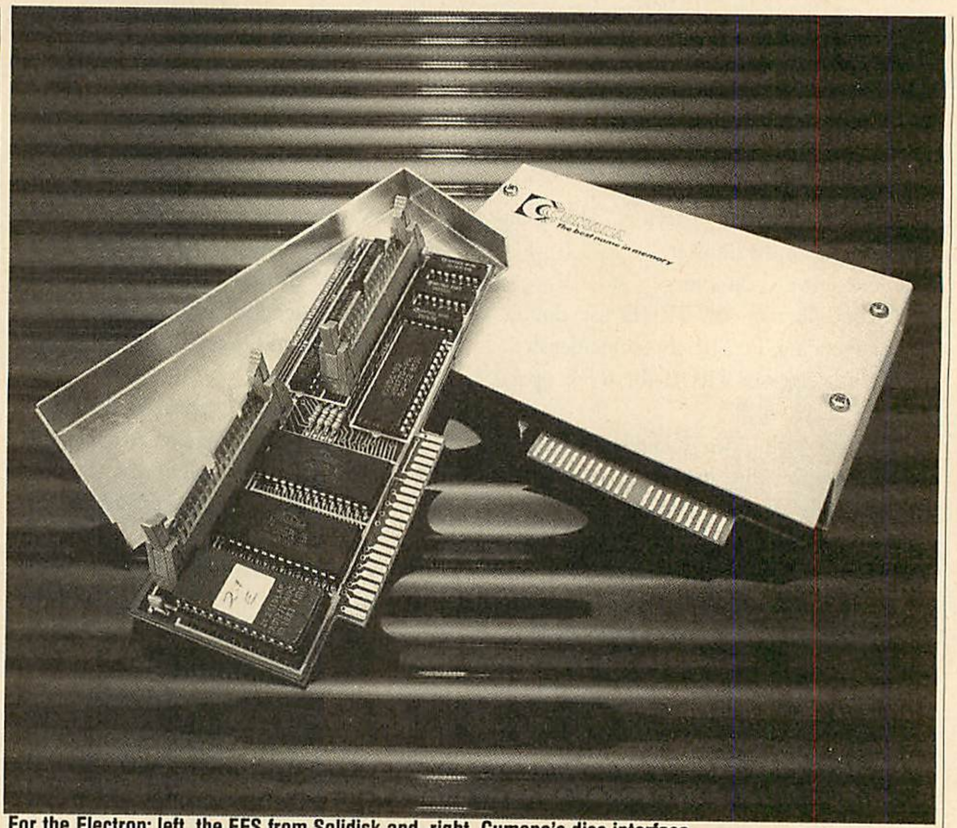
The big drop in prices happened about 18 months ago when 100k drives could be had for £40. This year things changed. Drive manufacturers cut production and prices jumped 20 per cent. Whether they will drop again is unclear. The world dictator of hardware standards, IBM, has gone for 40-track drives with discs which have a quadruple density for packing in data, rather than 80-track with double density. This means the 40/80 drives which have become a UK BBC micro standard will become less popular with drive manufacturers.

One thing which is clear is that hard disc drive prices are plummeting, with 5Mb versions (that's 5000k) coming in at under £350. However, these should be seen as a mass storage extra to floppy drives, rather than replacing them.

The great advantage of disc drives is their speed and ease of use. If you've yet to take the big step and don't understand all the talk about formats, densities, tracks and sides, don't worry. You've got a bit of work to do, but once you get going you'll never regret it.

There are problems, however. The first is that the DFS eats up memory – 2.75k with Acorn's, and a larger 3.75k with the ADFS (except on the Master where no memory is lost). So some of your cassette-based software won't run. Next is that disc versions of some software – especially games – are not available. Also, transferring some software from tape to disc can be difficult, although there are many utilities to do this, including some in past issues of *Acorn User*.

To use discs you need three things – a disc drive, an interface (based around a disc controller chip) and a disc filing system (which is often included in the price of the interface).



For the Electron: left, the EFS from Solidisk and, right, Cumana's disc interface

The interface allows the micro's hardware to control the motors and read/write head in the disc drive. The disc filing system (DFS) controls the flow of information to the disc surface from the micro and vice versa.

Nice simple theory, but the practice is a bit more involved. There are lots of disc interfaces and DFSs to choose from and there's also the choice of drive. We'll talk about the interface and DFS now and leave the drives for later. Let's look at the 'official' offerings from Acorn.

Acorn's first standard DFS was version 0.9 (which had several variations) with the 8271 controller chip. A later version of the DFS (1.2) was combined with the network filing system on one chip to become the DNFS. Then along came the B+ with version 2.0 (again with variations) linked to the 1770 controller. Next was DFS 2.2 in the Master which attempted to solve some of the incompatibility problems with disc software written with the 8271, caused by protection methods.

The Master comes with an interface based on the 1770 disc controller chip built in, with two DFSs (DFS series 2 and Advanced DFS) ready to connect a drive up to. Similarly, the B+ comes with the 1770 and DFS series 2. So you can go to the section covering drives if you own either of these micros.

Readers who have a BBC B with a disc interface already fitted undoubtedly have the 8271 disc controller with a DFS 0.9 or DNFS. All you need do is to go out and get your disc drive. If you find the facilities limiting, consider a disc utility chip such as *Disc Doctor*, or look at upgrading to the 1770 with ADFS, although memory is a problem (see Joe's Jottings June '86 and the February '86 disc round-up), or one

of the other DFSs developed to overcome the problems of DFS 0.9 or double density – Watford's came out top last July.

If your BBC B has no disc interface fitted, you're unlikely to be able to get an 8271 as it's been replaced by the 1770 controller interface with DFS series 2 (at about £50). The ADFS costs an extra £25.

Having said this, though, Acorn has run into problems changing from the 8271 to 1770. Most disc software was – and some still is – written to use the 8271 for software protection and so would not work on the 1770. Luckily this is becoming less of a problem as the latest disc filing system chips from Acorn (ie, version 2.2 and above) can fool the software into thinking it's running on an 8271.

Electron owners were presented with the Plus 3 by Acorn which uses 3.5in drives. These are great little drives using virtually indestructible hard-cased discs, but there is little software for them. Also the ADFS (fitted as standard) eats up even more memory than the BBC DFS. The alternatives are outlined below.

The July 1985 issue of *Acorn User* reviewed six DFSs/interfaces from Watford, MRM, Opus and Viglen. These were launched to give better facilities than Acorn's 0.9 DFS, and then to give double density – twice as much data stored on a disc side. However, commercial disc software is written to use the most standard system, and buying anything other than Acorn's 'official' disc interface can add to the problems of software compatibility.

Most discs are protected from illegal copying by doing peculiar things to the disc interface. This protection is tested on Acorn's DFS and *sometimes* on the alternatives from other manufacturers. Of course the DFS makers try out new software on their products, but someone is always thinking up even more sophisticated protection methods which when used on a non-standard disc interface, make it think the disc is an illegal copy and will not run!

Many independent manufacturers do offer an upgrade in such cases, but check this out as it may be charged for.

Whether you go for a non-Acorn DFS depends on whether you value the facilities of the alternative or compatibility more. For what it's worth, our advice here would be to go for the Acorn 1770 disc interface, which is good value at £49.95. If compatibility is not of prime importance for you (that is, you don't buy commercial software), then the Opus DDFS has much in its favour (see July 1985). Another contender would be the Solidisk DFDC which is a firm favourite with several *AU* authors (see review September 1985) because it is fitted with both 8271 and 1770 chips which are selected by the flick of a switch. Electron owners now have four disc interfaces available to them. Three of these – Acorn Plus 3, Cumana and Solidisk were reviewed in February 1986 – and the fourth, from ACP, is looked at on page 159 of this issue. The last three can hook on to any size of disc drive, although the Cumana one uses a non-standard format and so cannot read BBC discs.

The most common type of disc drive uses 5.25in floppy discs. The choice here is simple: buy only a 40/80 switchable drive. We'll explain – there are two formats of disc, the 40 track and the 80 track. Quite simply a 40-track disc has 40 concentric rings electronically marked on its surface onto which it can save data; an 80-track disc has 80 such rings, so holds twice as much data – 200k as opposed to 100k. In days gone by, one disc could not be read on a drive format other than its own, but now most drives have a small switch enabling you to read either type of disc.



Opus Challenger 3: virtually instant RAM disc

The July '85 and February '86 issues contained a round-up of disc drives. Prices are changing all the time so *always* check before you order. Also look for hidden costs – some drives work out more expensive because of higher freight charges.

There are a variety of configurations available so compare each. Take care to examine the size and make sure you buy a drive which suits the geography of your set-up. Drives also come either with a power supply unit or without, in which case they draw power from the auxilliary power socket on the micro – I'd always go for a drive with a PSU (which costs more but is less of a strain on a Beeb which may have internal power-consuming additions, though this isn't the case with the Master). Look for 'plinth' versions where the drive(s) are mounted on a 'bridge' over the micro which can be used as a monitor stand.

Unfortunately the smaller 3in drives, which we've always thought were very good with many advantages over the more standard 5.25in drives, have not caught on, due mainly to a lack of software available for them. Another type of disc drive has appeared – the RAM disc. This simply consists of memory chips which the disc filing system uses as though they were a floppy disc. The great advantage of the RAM or silicon disc is its speed – it's virtually instant! Conventional disc drives are that much slower because each disc access requires the disc head to be moved across the surface of the disc to the correct point – not so in a RAM disc.

The Opus Challenger 3 is a standard disc drive with up to 512k of RAM disc plus the OPUS DDOS fitted within the drive case. If you are looking for a complete, simple upgrade this may be your best bet as it just plugs into the 1MHz port. However, you should bear in mind the compatibility aspect discussed earlier.

A much cheaper RAM disc is that produced by PMS (reviewed in March '86) although this offers just 64k of 'disc surface'. More recently the Morley RAM disc has been advertised, and allows a RAM disc of up to 2Mbytes.

Although very fast in action, RAM discs do need to be saved to a conventional disc before switching off as all their contents are lost when the power is turned off, so they do not replace the standard floppy disc. Unless you need very fast data collection techniques, they have a limited advantage over a standard disc drive, which you would need anyway.

A hard disc (or Winchester) is, as its name implies, a solid disc, housed within a small box along with some interfacing. You do not change and swap them as you would a floppy – but then it takes a while to use up 10 or 20 Mbytes! A hard disc plugs into the 1MHz bus and acts as fifth drive.

Until last year a hard disc would have set you back around £1700; then Solidisk released a 10Mbyte version for £500, with 20Mbytes costing £750. Until recently the Solidisk Winchester has a disadvantage in that it needed a Solidisk 1770 interface to run. However, Solidisk adverts say the system is now Acorn-compatible, so it should run as the basis of an Econet system.

Midwich has also been marketing hard discs, but virtually exclusively to schools. These work with the company's own DFS or Acorn's ADFS and come in 5Mb (£518) and 20Mb (£1215) sizes.

Viglen has recently released a 20Mbyte hard disc for a competitive £759. The price includes an ADFS ROM which can be discarded if you have a Master. The unit will operate on a disc-based BBC B with 8271 chip as it has its own interface – just plug the ADFS chip in.

A preliminary play around shows that the Viglen system is somewhat quieter than its Solidisk counterpart. *Acorn User* will be carrying a detailed review of these systems which will follow in a forthcoming issue.

STAR LOADER

Michael Ginns presents a program which allows ambiguous filenames to be used in Load commands

A safety feature built into disc filing systems is that you cannot load a file using an ambiguous filename. In other words, you must use LOAD"Filename", and not LOAD"F*" where * is a wildcard meaning load any file you find starting with F. Of course DFSs do allow such ambiguity with certain other commands, *ACCESS and *INFO being the most notable.

The program below (listing 1) will allow you to use ambiguous filenames in LOAD commands. As it stands it assembles from &A00, though it could be relocated elsewhere by giving the variable 'wildcard' (line 120) the relevant address.

The program works by intercepting the OSFILE vector each time a 'load file' command is issued. The routine takes the ambiguously specified filename and issues a *INFO command for this specification. This would normally result in file information being printed out for any corresponding files. However, OSWRCH is also re-directed so that this does not happen – instead, the first nine characters are captured and stored in a buffer. These will make up the first filename on the disc which matches the filename spec. This filename is then used for the LOAD operation.

A slight complication is that a drive number, if present in the filename, has to be checked for separately and included in the final specification. The program uses only legal calls and as such should work on all DFSs provided they comply as follows:

- the DFS must have a *INFO command which outputs the data file in the same Acorn standard format, and
- the DFS must support the normal file system calls and vectors.

The program has been tested and works on a BBC B, BBC B+, Master and Electron.

In use

Enter the program and save it as "AMBIG". A checksum is included and will tell you if you've made any errors. Correct as required and resave the source program. Once RUN the program is installed and ready to use. The wildcard used to specify ambiguous characters within the filename is a '*'. Try re-loading the AMBIG file, using a * as the wildcard, thus:

LOAD "A*"

Note that you can use any number of characters followed by the * – only the first matching file found by the routine will be loaded. If you want a specific file to be loaded you must be less ambiguous. For example, two files on disc are "AMBIG" and "ADIG" – to load ADIG use "LOAD AD*", and to load AMBIG use LOAD"AM*".

The routine will survive pressing the Break key, but not a CTRL-Break.

Line-by-line

Lines 70 to 90 preserve the current contents of three vectors used; lines 170 to 190 check for a LOAD command, and branch to 'load' if found otherwise go directly to OSFILE; lines 210 to 280 repoint the error vector to the new error routine; lines 300 to 380 place the address of the filename in the OSFILE control block; lines 400 to 600 copy the filename to the buffer, and point OSCLI to *INFO which it then does; lines 620 to 770 modify the OSWORD control block to point to a new filename; lines 790 to 990 intercept OSWRCH and suppress characters.

LISTING 1. ALLOWS WILDCARD CHARACTERS WHEN LOADING

```
   10 REM Ambiguous
   20 REM File Loader
   30 REM by Michael Ginns
   40 REM for BBC B/B+/M/E
   50 REM (c) AU July 1986
   60 :
   70 osfile=!&212 AND &FF
FF
   80 oswrch=!&20E AND &FF
FF
   90 brk=!&202 AND &FFFF
  100 fsp=&82
  110 block=&80
  120 wildcard=&A00
  130 :
  140 FOR pass=0 TO 3 STEP
 3
  150 P%=wildcard
  160 [OPT pass
  170 CMP #255
  180 BEQ load
  190 JMP osfile
  200 .load
  210 LDA #(intercept MOD
256)
  220 STA &20E
  230 LDA #(intercept DIV
256)
  240 STA &20F
  250 LDA #(error MOD 256)
  260 STA &202
  270 LDA #(error DIV 256)
  280 STA &203
  290 :
  300 STX block
  310 STY block+1
  320 LDY #1
  330 LDA (block),Y
  340 STA fsp+1
  350 DEY
  360 LDA (block),Y
  370 STA fsp
  380 STY start
  390 :
  400 .filename
  410 LDA (fsp),Y
  420 CMP #58
  430 BNE notcolon
  440 TYA
  450 ADC #2
  460 STA start
  470 LDA #58
  480 .notcolon
  490 STA name,Y
  500 INY
  510 CMP #13
  520 BNE filename
  530 :
  540 LDA start
  550 ADC #8
  560 STA finish
  570 :
  580 LDX #(buffer MOD 256
  590 LDY #(buffer DIV 256
  600 JSR &FFF7
  610 :
  620 LDA #255
  630 STA start
  640 JSR &FFE7
  650 LDA #13
  660 LDY finish
  670 STA name+1,Y
  680 LDY #0
  690 LDA #name MOD 256
  700 STA (block),Y
  710 INY
  720 LDA #name DIV 256
  730 STA (block),Y
  740 LDA #255
  750 LDX block
  760 LDY block+1
  770 JMP osfile
  780 :
  790 .intercept
  800 STY temp
  810 LDY start
  820 BMI notactive
  830 CPY finish
  840 BCS disabled
  850 STA name,Y
  860 INC start
  870 .notactive
  880 LDY temp
  890 :
  900 JMP oswrch
  910 .disabled
  920 LDY temp
  930 RTS
  940 :
  950 .error
  960 PHA
  970 LDA #128
  980 STA start
  990 PLA
 1000 JMP brk
 1010 .buffer
 1020 OPT FNequs("*INFO ")
 1030 .name
 1040 OPT FNequs(STRING$(3
2," "))
 1050 .temp
 1060 BRK
 1070 .start
 1080 BRK
 1090 .finish
 1100 BRK
 1110 ]NEXT
 1120 :
 1130 PROCcheck
 1140 !&212=!&212 AND &FFF
F0000 OR wildcard
 1150 !&84=!&212
 1160 *KEY10 !&212=!&84|M
 1170 END
 1180 :
 1190 DEF FNequs(string$)
 1200 $P%=string$
 1210 P%=P%+LEN(string$)
 1220 =pass
 1230 :
 1240 DEF PROCcheck
 1250 total%=0
 1260 FOR byte%=wildcard T
O P%-1
 1270 total%=total%+?byte%
 1280 NEXT byte%
 1290 total%=total%-?&202-
?&203-?&20E-?&20F-2*(?&212
+?&213)
 1300 IF total%<>19357 PRI
NT"Checksum error - please
 check listing":END
 1310 ENDPROC
```

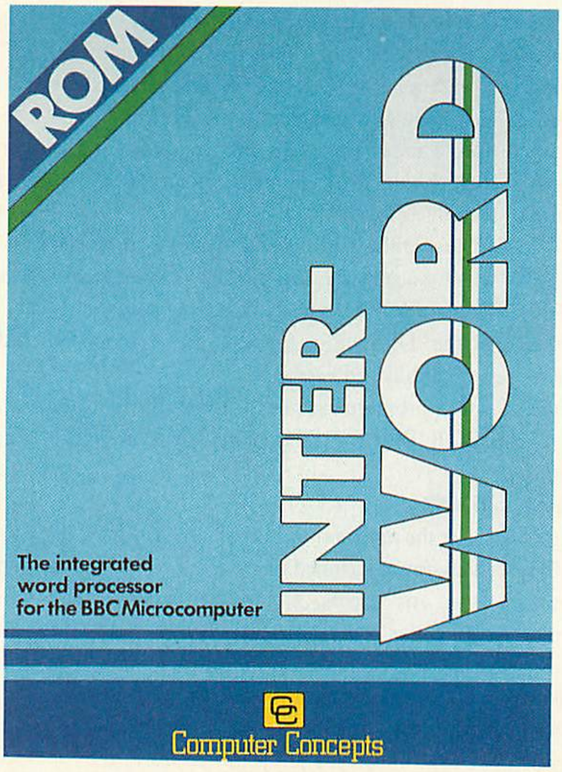
INTER-WORD

INTER-WORD is the ultimate word processor for the BBC micro. Just look at its features:

- Part of the only truly integrated suite of programs for the BBC micro.
- The most comprehensive WYSIWYG image of the final document, fully paginated, centred text, justification, etc.
- Super-fast smooth scrolling in all available modes. Sideways scrolls as well if necessary.
- Documents may be edited in any of 40, 53, 80 or 106 column screen modes.
- Multiple copies.
- Multi-column printout.
- On-screen bold, underlining and marked areas shown.
- Easily set preferences including: screen colours, key repeat rate, line numbering, cursor line, etc.
- Printer setup to allow simple access to any printer effects on any printer.
- Pull down menu driven throughout. Menus exist for printer setup, page size, preferences, spelling check, status, etc.
- Easy selection of filenames for save or load; all filenames in current directory are listed on-screen.
- Fully compatible with DFS, ADFS and ECONET.
- ALL FEATURES OPERATE FULLY ON: MASTER, B+128, B+, standard-B, B with Watford or Aries shadow RAM.

ROM-LINK programs can all hold their data in memory simultaneously. In fact, each may hold more than one set of data. This means that INTER-WORD can cope with more than one document in memory at once.

THE INTEGRATED WORD PROCESSOR FOR THE BBC MICRO



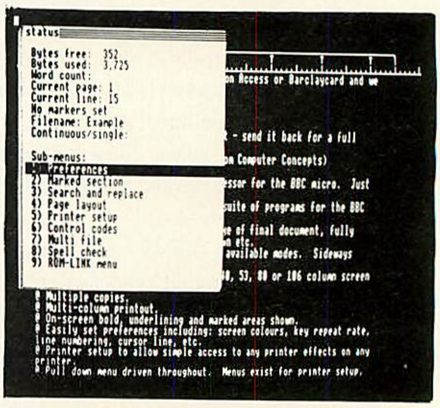
ROM-LINK

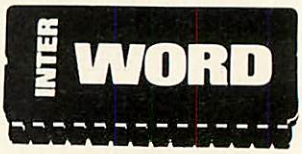
The ROM-LINK suite, of which INTER-WORD is an important part, is a uniquely flexible set of integrated ROMs, compatible with all models of the BBC micro.

MONEY-BACK *Guarantee*

Buy INTER-WORD—if you don't like it—send it back for a full refund!
(Available when purchasing direct from Computer Concepts)

Data may be transferred from one program to another with the minimum of effort. A spreadsheet may easily be transferred to INTER-WORD and re-arranged to suit the format of the document. Similarly a spreadsheet set up in INTER-WORD may be directly imported into INTER-SHEET.





INTER-WORD is 32K long (longer than any other BBC word processor)—BUT—due to a unique design, it is supplied in just ONE CHIP compatible with all machines.

No other so-called integration system is as powerful. Other systems can only transfer data in a very limited way, making it impossible to transfer figures from the word processor into the spreadsheet for example. No other system can support data from different programs in memory at the same time.

COMPATIBLE WITH THE BBC MICRO MODELS B, B+, B+128 & MASTER

INTER-WORD

INTER-WORD shows an accurate image of the final printed text during editing. It is continually re-formatted as new text is entered, so ensuring that the screen always accurately represents the final document. Justified text is also shown while editing; this includes left, right and fully justified and centred text.

The layout of text is controlled by rulers. These are extremely easy to insert and just as easily changed to give a different format. Any aspect of the ruler can be changed by 'dragging' its position marker using the cursor keys. No description can do justice to the intuitively simple ruler editing.

Although embedded commands are little used in INTER-WORD, some embedded commands are still allowed and may be 'hidden' in the text without upsetting the screen format, appearing only if they need to be edited. ANY codes for ANY printer can be included at ANY point within the text. Standard effects such as bold and underlining are shown on-screen. A simple printer code menu allows codes for any printer to be easily included.



Multiple-column printout facility is an integral feature. After setting the text width to suit one column and setting the number of columns, printing out is just a matter of pressing a key.

INTER-WORD uses a similar method of marking sections of text to WORDWISE. This provides a simple and very effective means of moving or copying any section of text to any other position in the document. However INTER-WORD has extended the marked section idea so that it may be centred or underlined or emboldened etc.

Comprehensive search and replace functions are included. The search and replace strings are stored so they may be used again and again. The user has the choice of case dependent searches or not. Wildcards are allowed.

INTER-WORD is very easy to use. Page format, preferences etc. are controlled from a series of pull down menus. Incorrect settings are impossible to enter, being rejected before they can cause a problem.

The latest computers make use of menus in the same way as INTER-WORD. There is no need to remember long lists of commands or values which may follow them, all options are shown on the menus.

For example there is a 'preference' menu. This allows easy selection of screen colour, key repeat rates, screen mode, whether TABS and CR are shown on screen or not, etc. There is a comprehensive 'printer setup' menu. This controls things like the number of copies printed, the number of columns, the line spacing etc.

Another menu is for control codes, so that the codes for underlining, bold and other screen effects may be set for any printer.

Saving and loading is performed via a file selector menu which lists the filenames and allows selection by name or by moving the cursor. Once tried, any other method of entering filenames becomes a real chore.

Most functions are controllable by one or two key presses as an alternative to menus. This allows users to choose whichever option suits their preference and experience.

> There is even a menu giving direct access to the associated SPELLING CHECKER ROM expected to be released later this year. This will be an entirely ROM based checker with over 50,000 words on chip ensuring that it is extremely fast. It also allows user defined dictionaries on disc or sideways RAM.

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Computer Concepts

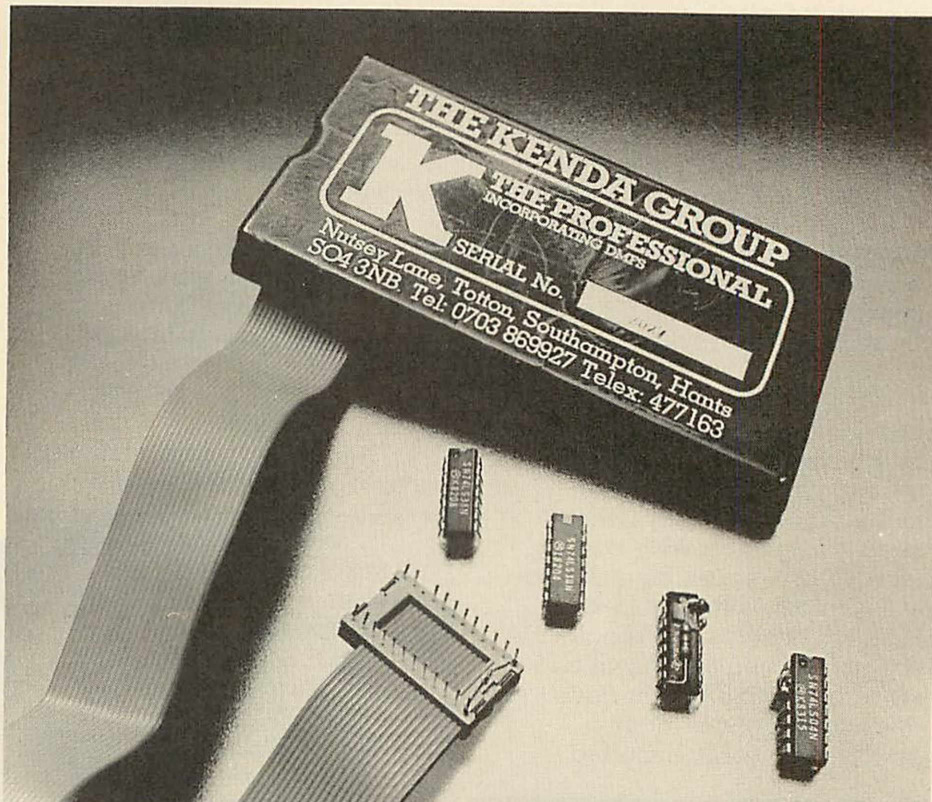
Gaddesden Place, Hemel Hempstead, Herts HP2 6EX

JUST THE BUSINESS

Michael Ginns considers the Kenda Disc Management Filing System and finds it to be a good, professional product

Despite the wide range of disc controllers and disc filing systems available for the BBC micro another complete disc upgrade has recently been released. The upgrade is made by the Kenda group and is an improved version of the one launched in 1983. The unit goes under the impressive name of the 'Disc Management Filing System with Professional Architecture for Disc Storage – DMFS with PADS for short! – and is specifically aimed at the business user who needs an advanced file management system.

The Kenda system arrives packaged in a sturdy cardboard box which provides adequate protection during transit. Inside are all the parts needed to upgrade a BBC micro to use discs. Most prominent is the main unit: a black rectangular block measuring 30 × 7 × 2cms which plugs into the normal floppy disc controller socket on the computer's main board. The pins on this unit are high quality turned ones and provide a very firm anchorage for it. A ribbon cable from the unit then plugs into a spare sideways ROM socket. To complete the interface there are four small chips, two of which have been modified by having components directly soldered across them and legs cut. This has been carried out very neatly, however, and should not cause any trouble. Finally there is a utilities disc and an instruction manual.



The Kenda DMFS: 'really comes into its own in education or business'

Installing the unit is similar to fitting the standard disc interface so you may like to ask whether your local Acorn dealer would be prepared to do it for you.

If you do decide to fit the unit yourself you will find the instruction manual a great help. It lays out in clear steps exactly what has to be done and makes the installation as painless a process as possible.

The disc unit supports both single- and double-density discs and automatically senses which is being used. It can control the usual maximum of four disc surfaces. However, unlike most other systems it treats the two sides of each disc as being one continuous storage surface so the user actually deals with two drives which are twice the size of the single disc surface. This is especially useful in the business environment where very long continuous files are needed. The maximum file length in the DMFS with double-density, double-sided 80-track discs is 704k.

The interface also includes some internal RAM for DMFS workspace. This allows PAGE to remain at its normal value of &E00, so releasing 2.75k of main memory. The internal RAM appears in the sideways ROM/RAM memory area, so some of the sideways RAM boards for the BBC micro do not function correctly, though Kenda says that work is being done to reduce this problem.

The architecture under which data is stored on a disc is very different from the standard Acorn DFS. The physical disc space is divided into logical storage blocks which are allocated dynamically to the file directory, or for actual file storage, as they are needed. This approach is similar to that used in other professional disc operating systems and means that the number of files allowed on a disc is now limited only by the amount of disc space available: this gives about 380 files on an 80-track double-sided disc. The use of this directory system also means that the dreaded 'Can't Extend' error, which plagued the Acorn DFS, cannot occur. As a file grows, additional free blocks from other parts of the disc are allocated to it. The DMFS keeps track of which blocks are allocated to a file and the order in which they have been used.

The complexity of the directory system does make the DMFS a little slow in accessing a file,

but when it has been accessed the actual data transfer is just as fast as with the ordinary DFS.

Another slight drawback with the directory structure is that the data blocks are much larger than the 256-byte sectors used in the DFS (2048 bytes in double density mode). As each file must start in a new block a 2049 byte file in double-density mode would actually occupy 4096 bytes, but when used with larger files this wasted space becomes inconsequential.

Where possible, the DMFS commands follow the conventions used in CP/M so making it very familiar to someone who has used CP/M before. The file specification, for example, has both a filename and an optional file extension. The filename can be up to eight characters long and is followed by a file extension of up to three characters. Upper and lower case characters are distinguished between and the file may be specified ambiguously.

As well as file extensions the DMFS further divides the file directory into 'users', up to 255 of which may be held on a disc. Each user has an associated set of files and the DMFS only operates on the currently selected user's files. This provides a very useful way of splitting a disc into groups of related files, eg, one user could hold a wordprocessor and its text documents, another could contain a database and accompanying data files, and so on.

A particularly nice feature of the DMFS is its treatment of deleting files. When a file is deleted, or overwritten, it is transferred to an area on the disc known as the deleted file directory. To all intents and purposes the file has been erased and disappears from the normal directory, but if it's needed again, it can be restored by unerasing it from the deleted directory. Only if a file is already in the deleted directory will an erase command actually destroy it. This makes it almost impossible to delete files accidentally and is invaluable when dealing with valuable data.

*A:	*DISK	*PIP
*B:	*DMFS	*PURE
*CAT	*DPAGE	*RENAME
*CUB	*DSTEP	*SPOOL
*COPY	*DUMP	*STAT
*CURE	*ERA	*TYPE
*DIRERA	*EXEC	*UNERA
*DISC	*NSTEP	*USER

Table 1. The primary command set

The primary command set for the DMFS is shown in table 1. When using the sytem you immediately realise how much care went into designing the commands to make the system easy to use. Instead of providing many different commands, Kenda has used simple core commands which have extensions to them to provide added functions. For example, the *STAT command provides information about a disc. However, following it with a file name produces information about the file thereby replacing the *INFO DFS command. Adding a further 'L' or 'U' causes the corresponding file to be locked or unlocked, replacing the *ACCESS command.

The vast improvements of the Kenda system over the standard DFSs have only been made feasible by using a radically different file architecture – so the system could not be compatible with the Acorn standard.

Having said this, however, Kenda has made a big effort to provide software support for transferring files between the two formats. There are two programs supplied on the utilities disc which will do this and a third, RDFS.COM, gives the DMFS limited read access of Acorn discs directly.

*ACCESS	*ENABLE
*BACKUP	*LIB
*BUILD	*LIST
*COMPACT	*TITLE

Table 2. The extra commands accepted

The DMFS also provides help in overcoming the problem that some of the DFS commands are different in the DMFS. Issuing the command *CURE allows the DMFS to accept the extra DFS commands listed in tables 2 and 3. Those in table 2 are claimed by the DMFS, to prevent errors, but are not acted upon. The functions of the commands in table 3 are actually emulated by the DMFS using the nearest one of its own commands. For example, '*DRIVE 0' would invoke '*A:'.

This software support means that most incompatibility problems can be got around if you are prepared to work at them – there is, though, still the problem of transferring protected software. The Kenda disc system certainly lives up to its name of being a professional DFS. The manual, too, is well written. It gives an overview of the entire system, clearly explains the various commands and also has a comprehensive technical section. The manual is still being extended and the unit is capable of much more than is described currently.

When deciding whether the Kenda system is suitable for you it is important to ask yourself what you want a disc system for. If you are likely to be working extensively with disc files and need a powerful management system then the Kenda DFS is ideal. If, however, you frequently want to use software on the Acorn format discs, and don't need the extra facilities provided by the Kenda system, then the standard DFS will be adequate. Certainly the Kenda system is not at all suitable for the beginner or the person who tends to use discs as a fast way to load games. Where the Kenda DFS really comes into its own is in education or business. The internal RAM, unlimited catalogue, long files, dynamic block allocation and CP/M style commands all make it ideal for this sort of work.

*DELETE	*DRIVE
*DESTROY	*INFO
*DIR	*WIPE

Table 3. Commands emulated by the DMFS

The Kenda group provides excellent backup for its product. I have found them very willing to help with any difficulties or technical queries which may arise.

I am also told that it is expected that an independent technical users' group will be set up to allow owners of the Kenda system to exchange software and ideas.

Kenda DMFS £98 + VAT
is available from the Kenda Group, Nutsey Lane, Totton, Southampton SO4 3NB. Tel: (0703) 869922

DISC ARCHITECTURE

	Single density		Double density	
Format	8-80 tracks		8-80 tracks	
Sectors/track	10		18	
Bytes/sector	256		256	
Reserved tracks	3 (0-2)		2 (0,1)	
Soft stagger	2 sectors		3 sectors	
Blocksize	1k		2k	
Maximum capacity	Files	Space	Files	Space
40 track SS	89	94208	82	172032
40 track DS	182	192512	169	352256
80 track SS	186	196608	169	352256
80 track DS	380	401408	346	720896

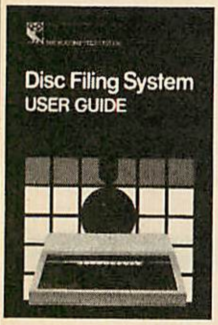
NB: space in bytes after formatting

COVERING THE CATALOGUE

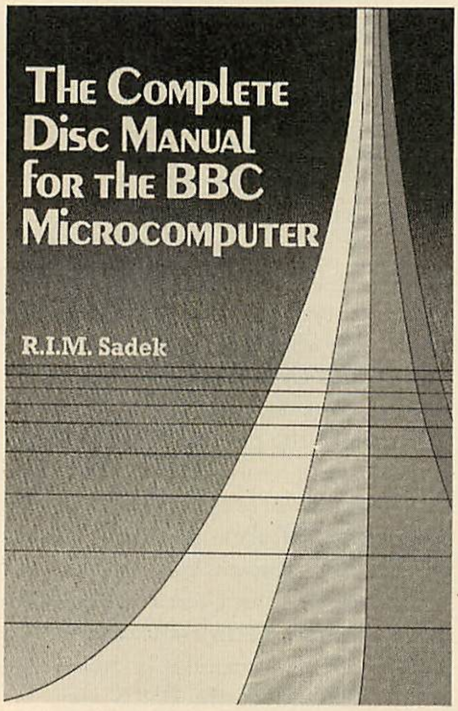
Martin Phillips rounds up some reading matter for disc users

The following selection of books for the BBC micro covers the use of disc drives and the BBC micro Disc Filing System (DFS). I have identified three categories into which these books fall: category 1 covers the basic DFS commands, and such things as formatting a disc, and disc handling; category 2 covers the Basic file handling aspects of the DFS and category 3 provides a full examination of all aspects of directly programming the disc controller chip, and a full description of the operating system calls. None of these books covers the use of the 1770 disc controller chip fitted to the BBC B+ and the Master, only the 8271 disc controller chip is dealt with here.

The only book in our list which just looks at category 1 applications is *The BBC Disk Book.* This covers each of the DFS commands quite soundly, and does point out that it is the underside of the disc which is drive 0. However, it then confuses the issue by having a diagram on the same page which shows side 0 as the top side of the disc. There are many unexplained terms towards the back of the book, especially when dealing with error messages – does it help you to know that 'drive fault C' is the 'ID CRC error'? This book tries to offer a simple approach, but at times poses more questions than it answers.



The next set of books covers both categories 1 and 2. The standard to hold up to the others is the Acorn *Disc Filing System User Guide.* This is very well written, with plenty of good diagrams. It covers all the DFS commands which are dealt with as one command per page on a structured layout. It also covers random access files, the operating system calls to the DFS, and some technical information about how information is stored on disc. (These topics are only briefly covered, and should not be seen here as a treatise on the subject.) The



text is packed with useful information which is well presented and easy to read, but there are a couple of astonishing errors. The book claims that drive 0 is on the upper side of the disc and confuses double density with 80-track format. It was also a pity that Acorn, in its wisdom, did not see fit to provide this handbook with each DFS, instead it was only obtainable when you bought an Acorn disc drive. This was rectified with the BBC B+, however, where the handbook *was* provided as standard, with a small addendum pointing out the changes in the latest DFS.

Because this guide was not provided as standard, most disc drives come with their own handbook: Watford, Cumana, Akhter and Pace, to name a few, all publish their own versions. Most are very similar to the Acorn version, both in style and presentation, and serve as a sound guide to the use of discs.

If I had to pick the best of these, it would be the Akhter handbook which is similar to the Acorn guide, and is easy to follow. The latest editions of this handbook cover the extra commands which are available on the BBC B+.

The Mysteries of Disc Drives and DFS Revealed does not live up to its name – not everything is revealed and there are many mysteries remaining unexplained.

Having said that, though, it is quite a nice little book with easy-to-understand explanations and many examples. It doesn't cover the operating system calls but does delve into file handling using Basic.

The BBC Microcomputer Disc Companion was one of the first books to become available on this subject, and it's now somewhat dated. The main problem I found was a lack of program examples to illustrate the use of some of the operating system calls. About a third of the book is given over to a chapter called 'Useful programs': I do not consider a standard disc formatter or disc verifier to be useful, as they are no more sophisticated than those provided with the disc drives. A wordprocessing program is also provided – I confess that I'm not convinced of its relevance here; I see it as a page filler.

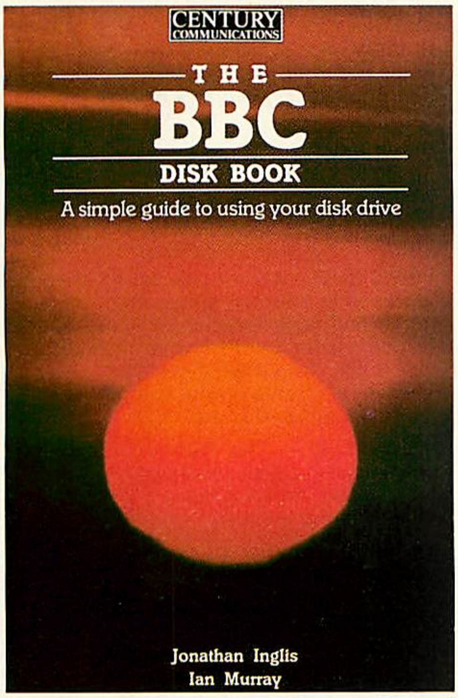


Disk Systems for the BBC Micro also gets the disc sides muddled up (it might seem a small point, but it shows the level of the author's knowledge). This book says a lot and tells you little: until you get to chapter 7 (Basic filing techniques) there are no program examples. The book also covers Amcom and Watford DFSs, and the constant reference to these tends to confuse rather than clarify the issue.

Disk Programming Techniques for the BBC Microcomputer is a book I quite like. Rather than adopting Acorn's *User Guide* approach, which simply explains what each DFS command does, the author spends some time showing the mechanism of each command as well. These explanations are supported by plenty of diagrams. For anyone who finds the Acorn *Disc Filing System User Guide* confusing, this book should certainly help. Once all the

DFS commands have been explained, seven case studies are given to illustrate some disc filing techniques which are presented in great detail, so that the not-so-expert programmer can gain the fullest understanding. The case studies include a program for storing names and telephone numbers, both in a serial and a random access file. There are case studies to show how a disc procedure library could be implemented, how a database could be programmed, and also two disc utility programs.

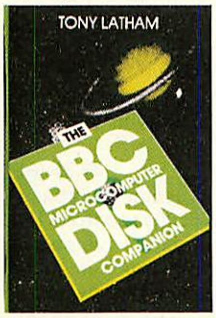
There are only three books which make any attempt to fall into category 3. The first is *Mastering the Disc Drive*, which is a well



presented book. Categories 1 and 2 are covered in a few pages, most of the book being devoted to the operating system calls. This therefore puts it out of the beginners' class, but should be useful to those who have worked through a basic disc user guide and want to know more. There are some quite useful programs in it, such as a disc recovery utility. Some of the listings are well documented, some are not. There is quite a lot of information hidden in this book, and it is well worth reading through several times to soak it all up.

The second category 3 book is the *Advanced Disk User Guide*. It is certainly not a beginner's book, as Colin Pharo plunges straight in to the depths of the 8271 disc controller and the operating system calls. It abounds with programming examples to illustrate the points made in the text.

Again, this book also manages to confuse which side of the disc is drive 0. That aside, this is certainly the book for the programmer who wishes to make better use of the disc operating system. There is almost nothing about the DFS commands, or about care and handling of discs; the book is devoted to the operating system calls. I can well see this becoming a cult book. It certainly takes a lot of mystique out of the disc operating system calls,



and offers plenty of routines which can enhance any program that uses a disc drive. It is a little heavy going, having a similar presentation to the *Advanced Disk User Guide*, but it's a super reference guide. I have one minor niggle, though, with this book – it assumes use of Basic 2. It would have been far better to assume that Basic 1 was used, then the programs would have worked on any BBC computer. I do hope, and I am sure that those readers who have a B+ or Master will likewise hope, that Colin will soon write a similar book covering the 1770 DFS.

The third book in category 3 is *The Complete Disc Manual for the BBC Microcomputer*. Considering that this book was published almost a year after the 1770 first appeared, and considering its title, it's a little surprising that there is no reference to this controller.

I am developing a phobia about drive 0. This book has a page of diagrams devoted to drive configurations; ie, showing which side is drive 0. All are incorrect.

My phobia apart, this book is well written with a pleasing presentation and it covers categories 1 and 2 as well as 3. It puts more emphasis on using disc facilities such as tape-



to-disc transfer and disc filing techniques from Basic than does, say, the *Advanced Disk User Guide*. There is also a clear and useful chapter on the 8271 disc controller chip.

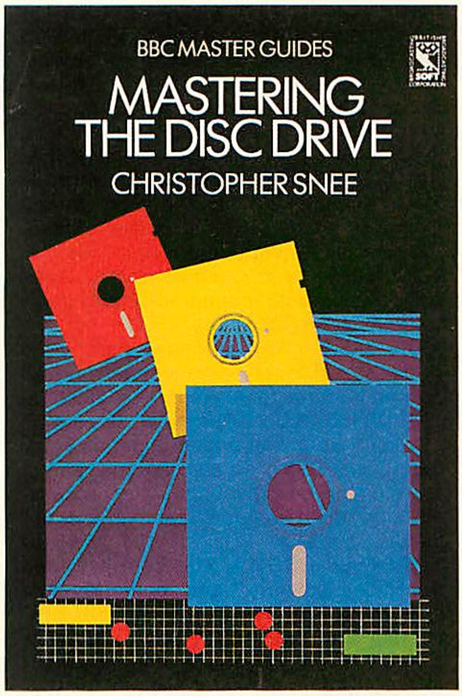
This book provides the most comprehensive treatment of any of the books reviewed here. The chapter on DFS operating system routines is a little thin, however, with only one example to show their use; but the volume does contain several useful disc programs. These are clearly written, but there are a couple of points of style I don't like; no THENs in IF . . . THEN statements and no variables after NEXTs, for example.

In conclusion, this is a good, all-round book on disc drives and the programming of the disc filing system.

There is no clear winner among these books – the choice will depend on why you want a book about disc drives and what level disc user you consider yourself to be. There is a great difference in quality, both in presentation and content, between the early disc books and the more recent ones.

A lot will depend on what style of book you like – do you like a book that gives a brief summary, or do you prefer one with plenty of diagrams and explanations?

The ones I would recommend are: for a general, concise introduction to the use of the disc drive and the DFS commands *The Acorn Disc User Guide*; for a more detailed approach to the DFS commands, together with some programming techniques: *Disk Programming*



Techniques for the BBC Microcomputer and for a detailed description of the operating system calls and how the 8271 disc controller chip works *Mastering the Disc Drive, The Advanced Disk User Guide* and *The Complete Disc Manual for the BBC Microcomputer*.

Disc Filing System User Guide Acorn Computers, £10

Mastering the Disc Drive Christopher Snee, BBC Master Guide, £7.95

Advanced Disk User Guide Colin Pharo, Cambridge Microcomputer Centre, £14.95

The BBC Microcomputer Disc Companion Tony Latham, Prentice Hall, £7.95

Disk Programming Techniques For the BBC Microcomputer Michael Coleman, Prentice Hall, £7.95

Mysteries of Disc Drives and DFS Revealed David Smith, Watford Electronics, £5.95

The BBC Disk Book Jonathan Inglis and Ian Murray, Century Communications, £4.95

Disk Systems for the BBC Micro Ian Sinclair, Granada, £6.95

Complete Disc Manual for the BBC Microcomputer R I M Sadek, Macmillan, £7.95

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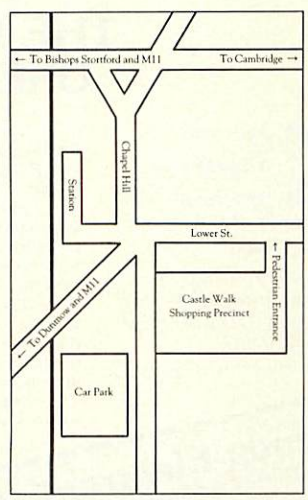
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AA213

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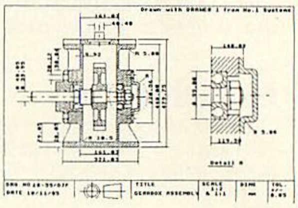
ANALYSER I and II compute the A.C. FREQUENCY RESPONSE of linear (analogue) circuits. GAIN and PHASE, INPUT IMPEDANCE, OUTPUT IMPEDANCE, and GROUP DELAY (except Spectrum version) are calculated over any frequency range required. The programs are in use regularly for frequencies between 0.1Hz to 1.2GHz. The effects on performance of MODIFICATIONS to circuit and component values can be speedily evaluated.
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Single or Dual 5.25" Disc Drive – 40 or 80 track.
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AA181A

Kenda Professional DMFS with PADS

THE FILING SYSTEM FOR THE SERIOUS USER OF THE BBC MICROCOMPUTER

K Kenda Electronic Systems Ltd
A member of the Kenda Group
Nutsey Lane, Totton,
Southampton SO4 3NB
Facsimile 0703 860800
Telex 477163
Telephone 0703 869927

The Kenda Disc Management Filing System (DMFS) with PADS is a powerful disc filing system package which, by using its own RAM, is able to operate without making demands on user memory.

The total package comprises the main module, protected by a lightweight shell, four associated I.C.s, a high quality disc containing Utility Programs and a comprehensive manual with sections on installation and operation, together with useful reference tables.

The Professional DMFS operates in either single or double density, with Auto Density Recognition and supports up to two disc drive units. It should be noted that Double Sided drives are treated as one continuous recording surface. This allows for a maximum Single File Size in excess of 700K Bytes.

The PADS (Professional Architecture for Disc Storage) software is based on a three level structure, each having a defined function, where all available space on the disc is utilised and file handling optimised. The disc architecture is intentionally structured as †CP/M, to achieve maximum flexibility, with space dynamically allocated in blocks of one or two kilobytes dependent upon density. Some obvious benefits, such as 'Compact' not being necessary and 'Can't extend' never occurring, are particularly helpful especially in Database applications.

One very important feature of the DMFS is the Erased File Directory which prevents immediate loss of data. When a file is erased, the associated blocks cannot be overwritten unless the file is deleted a second time. Until then, the file may be recovered by use of the unerase command.

Provision of such a powerful system, which removes fairly severe limitations normally encountered, has necessitated deviation from the standard DFS format. Software utilities are therefore provided to copy discs from DFS to DMFS (and vice-versa) should the need arise.

†CPM is a registered trade mark of Digital Research Inc.

- Both sides of the disc treated as one storage area
- Up to 380 files per disc and up to 255 users
- Maximum file size in excess of 700K bytes
- No 'Compact' necessary
- Random access – any file easily extended until disc full
- All files open for output can be individually extended
- 'Can't extend' cannot occur

- No user RAM, up to 3 files open – page 0E00
- Optional, up to 5 file open – page 1900
- Global or selective STAT of files, also with Lock and Unlock
- Expanded error codes and wildcards handling
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- Ideal for data-base applications

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SWITCH ON AND GO

Bruce Smith looks at one of the latest releases for the Electron, the AP4 disc inteface from Advanced Computer Products

One company which has been giving a great deal of support to Electron owners over the past 12 months has released what could be its best product to date, the Advanced Plus 4 – a disc interface for £80.44.

The AP4 from Advanced Computer Products requires that you have a Plus 1 fitted to your Electron and a suitable disc drive to plug into it (see the round-up on page 148). Once installed in either of the expansion unit's cartridge slots. The disc drive is plugged into the port at the back of the AP4 and that's it – just switch on and go.

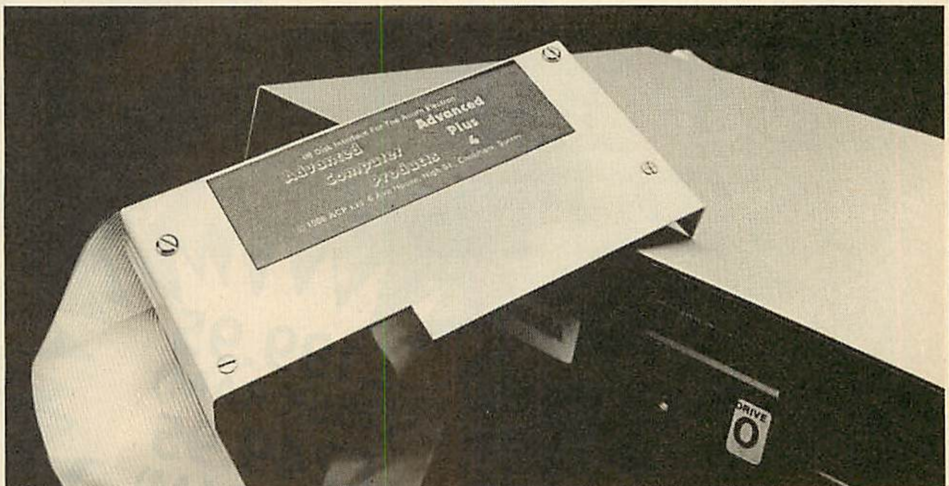
The heart of the AP4 is the 1770 disc controller chip, which is the same as that used on the BBC B+ and Master series. PAGE remains at &E00, ie, the same as for a tape-based system which means that most tape-based software can still be run

Program function	AP4	EFS
Save 20k mode 2 screen	4.7	5.3
Load 20k mode 2 screen	4.3	3.3
BPUT 1000 bytes	4.1	4.2
BGET 1000 bytes	3.5	3.2
PRINT 1000 strings	20	31.2
INPUT 1000 strings	14	19

Table 1. Speed tests

The Disc Filing System (DFS) ROM is ACP's own Advanced Electron DFS (AED), which is installed in one of two ROM sockets on the AP4. The other ROM socket is free to take a further sideways ROM – it could be the Advanced DFS (ADFS), available from ACP soon. Removing the lid also reveals the 1770 disc controller chip, 8k of RAM for use by the AP4 and a well-designed and produced circuit board.

The AED provides all the standard DFS commands as well as a few extra ones including disc FORMAT and VERIFY. Also included are a few Master-type commands such as *DRIVE and *ROMS. The former allows you to read a 40-track disc on an 80-track drive, while the latter displays a list of ROMs installed in your Electron.



'The great thing about a disc interface like this is its ability to run Beeb disc-based software'

The great thing about a disc interface like this used with a 5.25in disc drive is its ability to run 'standard' BBC micro disc-based software. In fact, as long as software does not take account of BBC micro hardware (such as Teletext and graphics chips), it should load and run with few problems.

The other point of note was its speed. While not comparable to a standard Beeb disc interface, it's certainly more than adequate and quiet in operation. Table 1 lists some timing results for a few programs I wrote to access the disc surface. Compared to its major rival, the Soldisk EFS, it comes out on top in four out of six tests. The timings, I should point out, were all taken with David Acton's stop-watch! Using the TIME function is not allowed, because to gain speed both systems seem to turn it off – or at least slow it down when performing any disc accesses. The AP4 works hard when in high resolution modes – to increase speed the Solidisk EFS turns the screen off so it doesn't have to waste time refreshing the display. The AC4 tries hard to do both, but results in bad screen interference. A useful 60-page manual is supplied which is both explicit and easy to read. If I was to find fault, it would only be because the manual does not go into disc theory or care, and for first time disc interfacers this could be a problem.

The AP4 is a very good product: table 2 shows that it scores more points that the EFS. Remember that the EFS does come with 16k of sideways RAM and includes a Winchester port which means that you can plug in a hard disc. However, for those of you looking for a disc upgrade for the Electron, the AP4 scores best – though at around £80 it is more expensive than I would have liked. In my opinion, the AP4 should be considered as the standard interface for the Electron.

Aspect	AP4	EFS
Design	4	2
DFS	4	3
Compatibility	4	3
Manual	5	3
Ease of use	5	5
Extras	4	4
Total	26	20

Table 2. AP4 compared to EFS (marks out of five)

Advanced Plus 4 £80.44. Advanced Computer Products, 6 Ava House, High Street, Chobham, Surrey GU24 8LZ. Tel: (0276) 76545

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£199.95 (256K RAM)
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Only Challenger has both a conventional double-sided floppy disc drive and a high technology RAM disc, effectively a second, lightning fast solid state disc drive which turns your unit into a unique dual system with up to a massive 1.2 Megabytes of useable capacity.

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With all that power and performance you can race through work conventional disc drives labour over and, when you need to save to floppy, the RAM disc backs-up your information in a fraction of the time without any need for tiresome disc swopping. A & B Computing, which voted Challenger "Best buy of the year", said: "Using the RAM disc is a real dream... We checked a document just over 21K long, which took 5 minutes 56 seconds on floppy and only 1 minute 7 seconds using the RAM disc".

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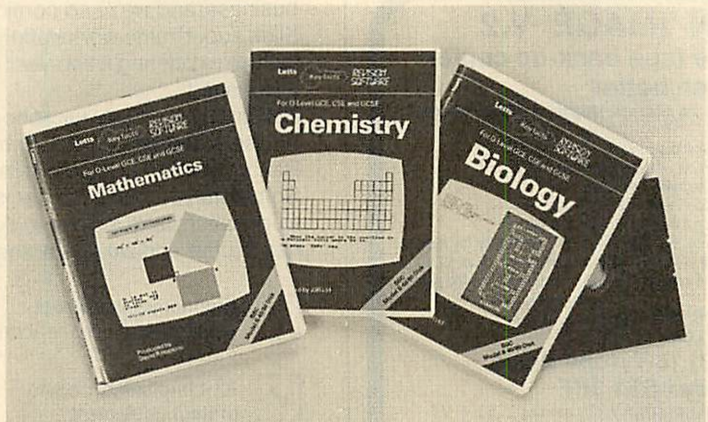
EDUCATION

NEWS

Start revising now

Last-minute revision is on the minds of many schoolchildren as 'O' levels have begun and 'A' levels are not far behind. Traditionally, pupils always leave their revision until the last minute and frequently approach it in a disorganised fashion, giving little thought to the processes which will help them retain the information.

Letts Revision Software provides a sensible bridge in that it monitors the student's study and provides an interactive means towards stimulating their interest. The materials are graphically interesting and, in common with other Letts Revision Aids, have been produced by experienced educationalists and programmers, ensuring that the suites of programs are of the very highest standard and follow good programming practice.



Just in time for the exams – revision software from Charles Letts

At present the range covers biology, chemistry, computer studies, English literature (*Henry IV Part I* and *The Merchant of Venice*), geography, mathematics and physics. The packages may be bought on disc or cassette and cost £10 + VAT. Details from Charles Letts and Co Ltd, Diary House, 77 Borough Road, London SE1 1DW. Tel: 01-407 8891.

Insight asks the questions

Quizzes and revision are always educational favourites, both at home and school.

One company which produces an interesting package in this line is Insight Software. Their *Qbank* series of educational software provides a way of generating a databank of multiple-choice questions relating to specific topics. The packages come complete with sets of 800+ questions but with the facility to add more.

The implication is, however, that a teacher may use the database as a central repository for questions and then generate new revision papers quickly and easily. This useful package covers physics, chemistry, integrated science, mathematics, biology, French, German, English, communications, and geography.

Further details from Insight Software, 3 The Witheys, Wanborough, Swindon SN4 0BQ. Tel: (0793) 790845.

EDUCATION TOP FIVE

	Title	Publisher	Cassette	Disc	ROM	Electron	B+	6502	Econet
1	Speech!	Superior	£9.95	£11.95	—	—	*	*	—
2	Factfile Questions	Kosmos	£3.95	£5.45	—	Yes	*	—	*
3	Grammar Tree	Wiley	£10.95	—	—	No	*	*	*
4	Best 4 Maths	ASK	£19.95	£19.95	—	Yes	Yes	—	—
5	First Steps with the Mr Men	Mirrorsoft	£8.95	£11.95	—	Yes	Yes	—	—

Compiled by Gallup/Microscope. *Contact publishers: Kosmos Software, 1 Pilgrims Close, Harlington, Dunstable, Beds. Tel: (05255) 3942. ASK, London House, 68 Upper Richmond Road, London SW15. Tel: 01-874 6046. Mirrorsoft, Maxwell House, 74 Worship Street, London EC2A 2EN. Tel: 01-377 4842. Wiley Software, Boffins Lane, Chichester PO19 1UD. Superior Software, Regent House, Skinner Lane, Leeds 7. Tel: (0532) 459453.

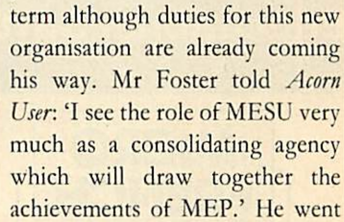
New head for MESU

The newly-appointed director of the Microelectronics in Education Support Unit (MESU) has been named as John Foster.

Mr Foster has had wide experience of work in educational technology and taught in the Royal Air Force and in Oxfordshire and Devon. He then joined the advisory service and since 1972 has been a member of Her Majesty's Inspectorate for Hereford and Worcester. He has also been closely linked with the Local Authority Support Services project.

The new director takes up his post at the end of the summer term although duties for this new organisation are already coming his way. Mr Foster told *Acorn User*: 'I see the role of MESU very much as a consolidating agency which will draw together the achievements of MEP.' He went on to explain that the original brief for MESU will be generally adhered to: that is, to supply information from a national centre, to train trainers, to provide teaching and other support materials for existing software and to continue the development of new packages for special needs.

This initial stance from the director-designate seems to show a desire by national government to rein in the very diverse and innovative activities that were generated under MEP.


John Foster, MESU's new director

Technology modules

The ability to examine Information Technology skills has increasingly become a problem as the area has rapidly grown. In schools the computer studies department has found itself responsible not only for the ever-changing area of IT, but also for the other departments in the school which wish to use new technology and providing them with resources, advice, training and other services.

Increasingly the computer studies area is being seen as the 'pure science' study area and IT applications are devolving into the general curriculum.

Thus, in the English department wordprocessors are becoming more common; in geography graphics, simulations and computer assisted learning packages are now showing their worth; and in Craft Design and Technology a revolution is occurring because of the change in emphasis not only in the classroom but also in the outside world.

Certificate

Very few departments are unaffected and yet the implication is that these 'real' uses of the technology have been removed from the computer studies area.

For this reason the University of Cambridge Local Examinations Syndicate has developed a modular, competency-based certificate in Information Technology Skills – as it's modular, the assessment of different IT skills may be made in different parts of the school. The pupil undertakes the modules as part of the general curriculum and is awarded a certificate for success in five modules. The certificate annotates the skills and experiences undertaken and is suitable for schools, FE colleges, secretarial and commercial colleges, adult and community education, YTS schemes and workplace-centred training. At present the modules cover computer literacy, wordprocessing, spreadsheets, databases, videotex and information systems, programming, control and microelectronics.

This new initiative may bring many of those redundant micros out of school cupboards.

The certificate is not related to any specific packages or hardware and so may be used in almost any situation. Details from the Publications Section, UCLES, 1 Hills Road, Cambridge CB1 2EU. Tel: (0223) 61111.

Networking for schools

A national network to link schools and their education authorities is beginning to emerge as a priority in the eyes of informed educationalists. Such a network already potentially exists in the shape of the Times Network for Schools (TTNS).

However, the lack of a positive national strategy on the integration of new technology into the curriculum has upset many agencies – not least the recently disbanded Information Technology Advisory Panel which which voiced criticism of government policy. Despite work by many regions, and individuals within the DES, there is still no firm strategy aiming to take schools into the 1990s.

Networks, providing the fundamental means of communicating information between computers, have to be the basis of any such strategy. Not only will they give access to common information, but also telesoftware, bulletins, administration databases and a range of activities which are more easily undertaken electronically than by 'paper storm'.

Systems of this type have been on-line long enough for general working principles to have evolved. What is needed is a co-ordination of this information, the creation of a policy to allow the end result to be implemented and the funding to enable schools to actually make use of the system. Already the 'schools' best friend' – the Department of Trade and Industry – has presented each school with a modem. Rumblings about a national database have been heard from the direction of the Department of Education.

Commentary by Nick Evans

Logo on the Master

Logo Software has announced that its LSL Logo is compatible with the Master 128 and makes full use of the micro's extra memory.

First, both Master and BBC micro users can buy LSL Logo on disc to run in sideways RAM. Prices start at £40 for a stand-alone system and one manual, £100 for a network licence and four manuals and £150 for a site licence and six manuals. Local authorities wishing to negotiate an LEA licence should contact the company directly.

Second, a two-disc toolkit of applications, interfaces and extensions comes free with the package and third, technical advice is always available via the Logo Hotline, (0454) 313076.

Details from Logo Software, 316a Richmond Road, Twickenham TW1 2PD. Tel: 01-891 0989.

Educational data files on offer

A database of educational software compiled by Nick Evans is available from *Acorn User*, in a variety of disc and file formats, at £5.75. The datafile contains over 1700 records and is available for the *ViewStore* database. It may also be obtained as a text file for the *View* wordprocessor, which can be converted into a datafile with other databases which have a utility to 'grab' records. To order, simply fill in the coupon below, or use a photocopy. The disc comes with a list of publishers.

Please send me............Educational Software Database discs at £5.75 each.

I enclose a cheque/postal order made payable to Nick Evans for.................

Please tick format required:

Disc track/side	40/single	40/double	80/single	80/double
View text files	☐	☐	☐	☐
ViewStore datafile	☐	☐	☐	☐
ViewStore and indexes*	N/A	☐	☐	☐

* *Number of indexes available depends on space on disc*

Name ....

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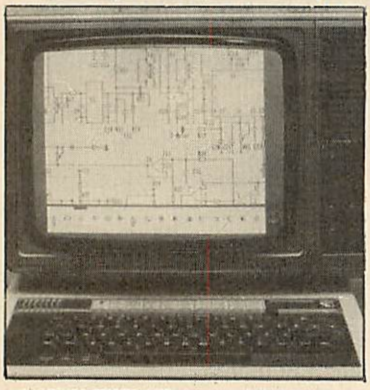
Send to Nick Evans, *Acorn User*, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF. Allow 21 days for delivery

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Originally designed for producing large circuit diagrams, DIAGRAM has now been improved to the point where it is invaluable for anyone who wishes to produce large areas of mixed graphics and text, and has many of the features normally found only in very expensive text/graphics processors.
DIAGRAM utilises a unique method of storing information on disc which allows not only very large diagrams to be created, but also allows rapid 'scrolling' of the screen both horizontally and vertically over the full area of the diagram.
The hard copy printout options available with DIAGRAM are second to none, and use is again made of the unique disc storage techniques to produce both horizontal and vertical printouts in various sizes down to probably the smallest high definition printing you have ever seen from your printer - a full 3*6 (18 mode 0 screen) diagram printed in a single print run onto an A4 sheet!

FEATURES

- Diagrams may consist of up to 39 mode 0 screens, defined in any aspect ratio, e.g. 3 screens across by 13 screens down, 10 screens * 3 screens etc.
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- Other features include selectable display colours, TAB settings, Index names, and many more.
- Diagram is compatible with most dot matrix printers (specify type when ordering), and printouts can be obtained of any specified section of the diagram, in varying sizes and in either horizontal or vertical print mode. With an FX80 type printer up to three screens may be printed across the width of the carriage, and there is no limitation (apart from the diagram size) to the number of screens that can be printed in the vertical direction - up to six mode 0 screens will fit vertically on an A4 sheet.
- The latest version of DIAGRAM is now fully compatible with Marconi Tracker Ball, which allows 'scrolling' of the screen and many of the editing features to be carried out using the tracker ball.
- DIAGRAM is supplied in an attractive hard backed disc wallet with keystrip and comprehensive instruction manual.

DIAGRAM SOFTWARE	MARCONI TRACKER BALL
£25 PLUS VAT P&P FREE. Supplied only on disc. Please specify printer type and 40/80T disc when ordering.	**£60** PLUS VAT P&P £1.75. Includes Icon Artmaster Software.

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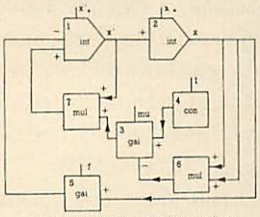
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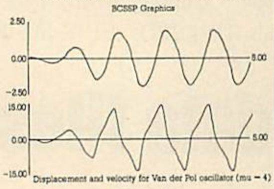
39 Brownlea Gardens, Seven Kings, Ilford, Essex IG3 9NL. Tel:01-599 1476.

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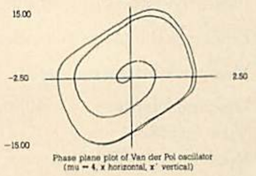
FOR THE BBC MICROCOMPUTER



BLOCK DIAGRAM FOR VAN DE POL OSCILLATOR



Displacement and velocity for Van der Pol oscillator (mu = 4)



Phase plane plot of Van der Pol oscillator (mu = 4, x horizontal, x' vertical)

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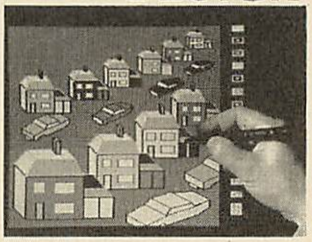
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1. The Robin touch pen with a music program, an elementary painting program, routines and instructions for using the pen in your own programs. **£30 inc. (on disc £33).**
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TO PUT IT ANOTHER WAY

Alternative ways of getting information in to computers are explored

Chris Drage and Nick Evans

It is unfortunate for young children that present day computers only offer a qwerty keyboard arrangement, since school micros are used in such a variety of applications that it's not necessary to use this keyboard layout in every application. As the computer is increasingly used with young children including those with special needs, it is simply unreasonable to expect keyboard skill to be a prerequisite of successful interaction with the software.

Should we present young children with so many bizarre symbols and expect them to cope? When we teach them reading we introduce lower-case letter shapes and their sounds gradually in the first few months of reception class. When we introduce these early readers to the school computer with its full upper-case qwerty layout, we still expect learning to occur. The problems for children who have learning difficulties or are physically handicapped can be exacerbated by having to use the qwerty keyboard. Are these children expected to struggle until they can cope with the standard keyboard? This month we look at a selection of alternative input devices which are proving their worth in the classroom. As secondary pupils, by and large, will have got keyboard skills, we shall concentrate our emphasis on primary and special education.

Alternatives to qwerty have been emerging over the years – some, like Grafpad II, have specific software applications and others, like the Concept Keyboard and Robin Lightpen, have a wider and more general use. No matter how excellent a device is, its real value to teachers can only be measured in terms of the software available for it.

The Concept Keyboard, marketed by AB European Marketing, presents the user with an array of touch-sensitive pads which may be programmed according to the user's needs. This feature opens the way to a vast range of applications. Each keypad uses overlays which are individual to each program so only the



The Touchtech 501 is an excellent input device for young children and those with special needs

inputs essential to that piece of software are presented, in a form appropriate to the experience or ability of the user. In addition, overlays are not restricted to a two-dimensional format. Elaborate 3D overlays can be constructed involving, for example, a model of the school environment, a park or a supermarket; actual models can then be moved over the board. The variety of arrangements is endless and once the unnecessary features of the normal keyboard are removed, life becomes easier for the child.

If it appears expensive, remember that a Concept Keyboard in the school can open up new opportunities for many youngsters and that, increasingly, software is being produced with an option for Concept Keyboard use. I have found the Concept Keyboard an ideal companion to wordprocessing packages and in graphics design. Used with *Folio* from Tedimen Software, its value for the younger children lies in being able to input lower-case letters (in alphabetical order), and even whole words, while older children appreciate using the Concept Keyboard with *Pendown* (Logotron). The popularity and success of this excellent wordprocessor are enhanced by attractive and well-designed overlays which allow both words and commands to be entered. *Computer Art II* is based on the graphics program described in the June 1985 issue of *Acorn User* – with this software the Concept Keyboard becomes an extremely valuable graphics input device: children can create colourful graphics screens simply and easily. With software for the secondary level now appearing, the future for Concept Keyboard users looks very rosy indeed. A full review of the Concept Keyboard appeared in the May 85

issue of *Acorn User*. The Robin Educational Lightpen was reviewed in Dec '84. This versatile input device offers strength, quality and simplicity of operation. There is an ever-growing range of good software available for it which opens the door to interesting classroom applications. Combined with the Robin Voice Box, for example, the light pen offers infant teachers and teachers of children with special needs the ability to use synthesised speech with a variety of very useful programs.

At Alsager County Primary School the Robin Voice Box has added a new dimension to language work with infant children. A dictionary of words was created using the allophone system and was based on the children's work books. These were then used during written work when the children became stuck on a word. At the computer they used the lightpen to pick the page they needed, then the word they were looking for. Once selected, the word was spoken by the Voice Box. Although grinding to adults, the children love the Dalek-sounding voice. The light pen has proven a success even for the least able and now a class of mixed first and second year juniors is also using the system with equal success. The word files and dictionary are longer and more complicated, but the support the system has offered in reading, writing and spelling is very valuable.

Glyn Howdle of Blythe Special School in Coleshill also reports a good deal of success with the Robin system. Using the Robin Lightpen graphics programs and a colour printer children with severe learning difficulties are now quite expert at making their own pictures and labelling their work. The Lightpen has added a new interest in the art work being done at the school. A fund-raising project involving the sale of calendars and special-occasion cards created with the Lightpen has raised money to fund further computer hardware projects. Even reluctant teachers now ask to use the school micro in their classrooms.

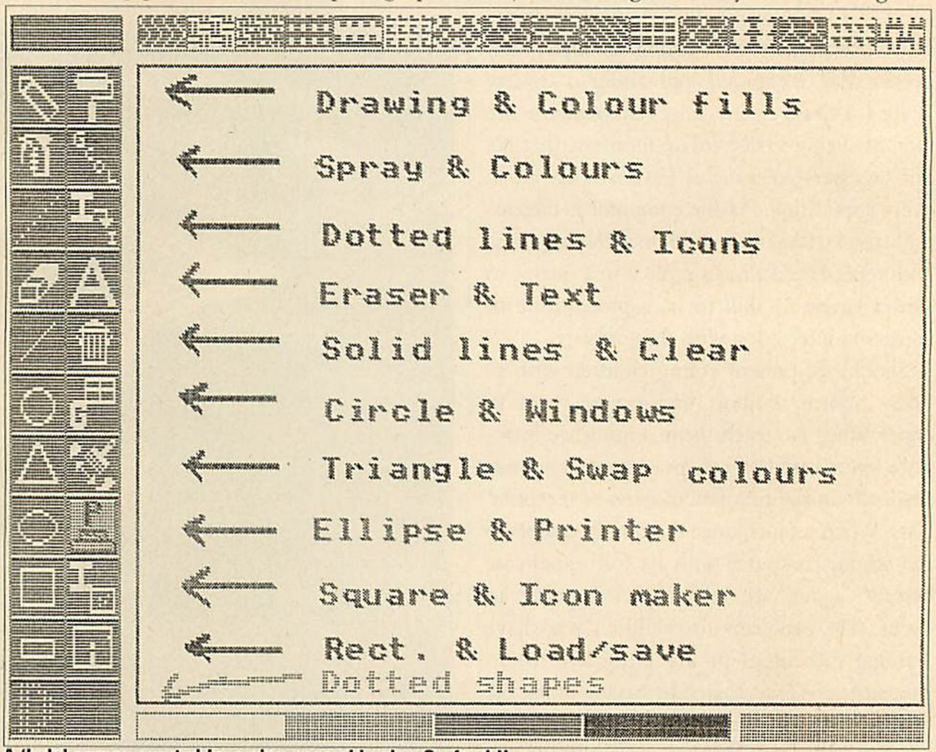
This school is integrating the Voice Box into its language, communication and reading programs. They chose the Voice Box because they felt the quality and volume of speech are good for the price. The teachers also liked the way speech could be added into their own software and felt that the software was extremely flexible and could easily be incorporated into the school's language programs. The advantage of speech which is created phonetically is that appropriate versions of speech can be tried with regional variations accounted for!

Children enjoy computer graphics. As they are familiar with wordprocessing they often talk about graphics work as 'picture processing'. Realising the need to adopt a developmental approach to the growth of skills and techniques, the school decided to get a variety of input devices which could be used for a number of applications, not just graphics.

Children begin in the infant school using the Robin Lightpen with the *Paintbrush* software. Older children graduate to *Computer Art II* with the Concept Keyboard. At the top of the school the AMX Mouse software is used as the oldest children are able to use icon-based software for all sorts of purposes. Recently, we have been looking for a device that would bridge the gap between the simple lightpen and Concept Keyboard-based systems and the complex *SuperArt* from AMS. Grafpad II from Grafsales Ltd filled this niche extremely well.

Although it appears relatively flimsy, Grafpad II has demonstrated that it is robust enough for classroom use and is a well-designed input device. It has very high resolution (1280 × 1024 pixels) and measures 360 × 235mm. One of the reasons for its success is that it uses a pen-like device for input: for the children it is an object which is immediately familiar. Selections are made with two buttons – execute and cancel. As no ROMs are needed for its operation, Grafpad II has the added advantage of being portable, and it can be used on any BBC micro. Another advantage is that it may be used by both left and right handers, but perhaps the biggest plus for the children is that they can now trace maps and pictures easily and accurately onto the screen and edit them accordingly. This is one operation which is impossible with most other input devices and children find it very exciting.

The Grafpad II includes an icon-based graphics program which is so simple to use that children are amazed at the 'professional' results they achieve in such a short time. Resembling AMS *Art* software, it includes the now familiar pattern and options menus. Moving the stylus moves a pointer over the screen to pick up the required icon and/or to initiate an action. Some options call sub-menus from which a variety of brush strokes and further choices may be made. The complexity seems to be just about right for 10-year-olds who get to grips with this medium very quickly. One child wanted to help others learn to use the system and created some delightful 'help' screens. As an Epson-compatible printer dump routine is included in the software children were delighted to be able to print out their works of art at the press of a button.

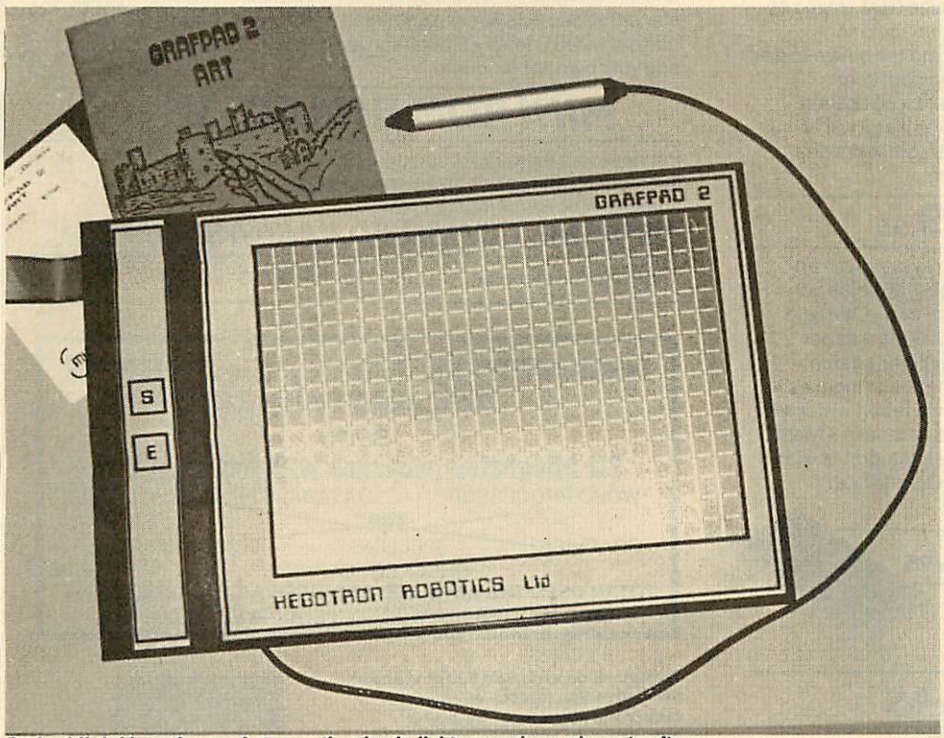


A 'help' screen created by a nine-year-old using Grafpad II

Their expertise in selecting the correct icon for a particular task grows daily. The software is so packed with features it is tempting to try and show the children all the 'tricks' possible but previous experience has shown that it is wise to give the children just a taste of the facilities on offer. It is then time to take an advisory role and let them discover what they can do: this approach has certainly contributed to the success of the Grafpad II.

So much has been written about mice as input devices that it seems pointless to say it all again here (reviewed in *Acorn User*, April '84),

but perhaps it's worth pointing out those items of software which have proved valuable at the junior school level. The mouse is used with the 11-year-olds as it uses icons (symbols), which younger children often find difficult to remember. The original *SuperArt* program is very popular as it's relatively simple to get to grips with, though one aspect children have found frustrating is its time-consuming load and save routines. *Artist*, from Wigmore, is very popular too, some children preferring its bold approach to the AMS software. It will be interesting to see how they get on with the newly acquired *Pagemaker+*. A practical point – do keep the area around the mouse environment clean. We have experienced a number of problems with dust and fluff interfering with the mouse's response.



Grafpad II: bridges the gap between the simple lightpen and complex art software

For children with special needs a whole range of special switches, puff-n-suck devices, and so on, are available. Each device is generally designed to meet specific needs. One input device which has a wide application in the primary sector (generally) and in special education (in particular), is the Microvitec Touchtech 501 touch screen. Introduced about a year ago, the Touchtech 501 appeared to have slipped into obscurity, but it is alive and well, with a growing range of software to support it. This may be reason enough to look twice at what may become a commonplace means of interacting with a computer in years to come.

The Touchtech 501 fits over the front of an M-series Microvitec Cub monitor and eliminates the need to use the standard keyboard at all – children simply touch the screen. Based on infra-red scanning techniques, the Touchtech 501 can open up the world of computing and communication to children who lack fine motor coordination: if a child can point a finger or stylus then he or she should be able to manage the Touchtech 501.

Bob Jones, a teacher of autistic children in West London, reports enthusiastically about the success of the Touchtech 501 in his school – it's earned the distinction of being the most successful piece of computer hardware, apart from the Beeb itself. Both teachers and nursery nurses who have been sceptical of the use of computers have taken to the touch screen enthusiastically. Children love it because it is 'friendly' and natural.

Much of the initial software is a demonstration of the touch screen's capabilities and though useful, needs to be developed further to be of any lasting value, but one or two programs have immediately proved worthwhile. A real gem of a program and a hit with the children has been *Cuppa*, a sequencing exercise based on making a cup of tea. The delightful graphics and ease at which each step in the sequence is selected, really show what is possible with the Touchtech 501. Similarly, *Odd Man Out* and *Cubes* proved very popular with the older children. Graphics are possible with *Painter*, a simple finger painting program which proved very popular.

MEP, which produces most of the Touchtech 501 software, has released a second disc called *The Touch Screen Sampler*. This has some very good programs, designed to make use of the features of the touch screen, as well as programs developed originally for the keyboard but which lend themselves well to use with the Touchtech 501. The programs range from pre-school to secondary age. They include games of strategy, a multiple point test program, an animated geometry program, a program which measures the size of real objects and a multiple choice quiz.

As an input device, the Touchtech 501 has been a resounding success: the autistic children's speed of response at the computer now has improved dramatically. However, it remains to be seen if the Touchtech 501 receives the supporting software from third party publishers which will allow it to become as popular as the Concept Keyboard.

There are many variations on the input devices outlined above and those mentioned are not necessarily definitive. Which ones do we think your school should choose? We are going to stick out necks out and say every primary school should aim for a Robin Lightpen and a Concept Keyboard. The quality and range of software determine these choices. The Grafpad II is good value compared to the price of mice but as yet has limited software support. The Touchtech 501 has so much to recommend it, the only serious limitation at present being the lack of good software. For secondary schools an AMX or Wigmore Mouse is a must. The quality and depth of software like *Pagemaker+*, *SuperArt* and *Artist* cannot be ignored. Remember, also, that the software for each of these 'rodents' is completely interchangable.

PRICES

Robin Educational Lightpen (£36) and **Robin Voice Box System** (£92) are available from:
Educational Software Co (Southport), 108 Parthenon Drive, Liverpool L11 7AQ. Tel: 051-226 1214

Concept Keyboard (A4 size £109, A3 size £139) is available from:
AB European Marketing, Forest Farm Industrial Estate, Whitchurch, Cardiff CF4 7YS. Tel: (0222) 618336

Grafpad II (£59.50) is available from:
Grafsales Ltd, Unit B, Derby Works, Carey Place, Watford WD1 2LR

The Touchtech 501 (£210) is available from:
Microvitec plc, Futures Way, Bolling Road, Bradford, West Yorkshire BD4 7TU. Tel: (0274) 390011

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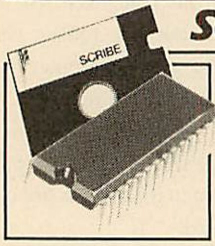
DATASCRIBE IS BRILLIANT VALUE FOR MONEY—

John Vogler, A & B Computing, Sept 1985.

I SHALL USE SCRIBE FOR MOST OF MY WRITING—

John Dawson, Your Computer, Feb 1985.

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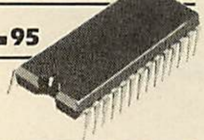
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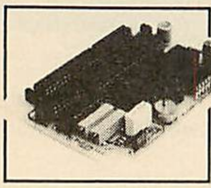
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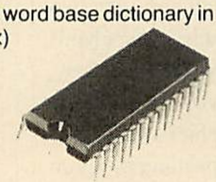
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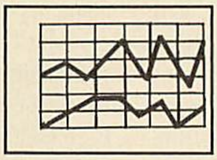
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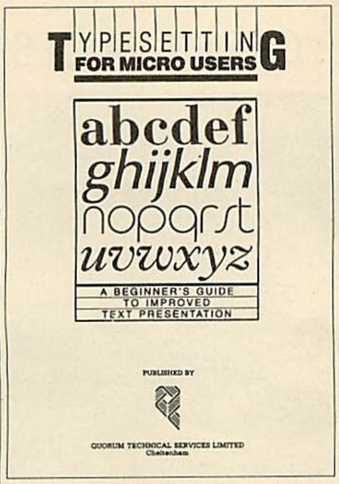
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BUSINESS

NEWS



Typesetting from Quorum

Typesetting for Micro Users is a comprehensive manual on how to prepare your text using a wordprocessor so that it can be used directly by typesetters without re-keying. Produced by the people who produce *Acorn User*'s bar code booklets direct from disc, it shows how to use a standard code, known as ASPIC, which can be interpreted by the more common typesetting machines.

The book will prove useful for anyone who uses typesetting regularly, such as small businesses, societies, and even typesetters themselves. It is available for £9.50 (including postage) from Quorum Technical Services Ltd, Sandford Park Trading Estate, Corpus Street, Cheltenham, Glos GL52 6XH.

Planning help

Beeb-Planner is a planning program based on critical path techniques for helping to sort out what to do and when.

Although available for some time it has recently been improved. Price is £39.95 (40 or 80 track disc). Further details from Mr Sheffield on Camberley 27501.

IBM tests on Master

by Steve Mansfield

Acorn has released the first details about IBM PC software running on the Master 512, with eight confirmed runners and five no-goers.

Software written using legal, documented MS-DOS system calls will run on the M512, but those which use undocumented calls, or software protection based on IBM hardware, are unlikely to work properly.

IBM programs which contain hardware-specific routines, such as poking the screen, will not run. Software which simply makes calls to the IBM ROM is handled by the M512's emulation software.

IBM emulation is performed in the Master 512's DOS+ operating system software. A virtual screen is kept in the co-processor's memory, with interrupt routines watching for any changes. If a change occurs, the Master converts it for the standard BBC micro screen format.

There are no similar routines for sound commands, however – the Master simply ignores them. Also, some of the more esoteric handshaking routines on the serial port have not been emulated.

MS-DOS and IBM software which has been tested and found to work perfectly on the M512 includes *Dbase II*, *Quest*, *Wordstar*, *Turbo Pascal*, *Lattice C*, *Supercalc III*, *VP Planner* and *Twin*. The last two are *Lotus 123* clones. *Lotus 123* itself, in common with *Dbase III* and *Symphony*, will not run on the M512. These programs access the disc controller chip as part of their copy protection: as this chip isn't present on the Master, the program crashes.

The M512 certainly seems to be living up to its promise of speed, running over three times as fast as an IBM PC using standard benchmarks.

As far as production is concerned, Julian Lomberg of Acorn told us: 'We seem to be getting there on time'. This should mean a few machines hitting the streets at the end of June, with the main supplies coming in July.

'Hacker' trial lessons

Electronic mail companies have been stressing the need for customers to look after their own security, in the light of the recent 'hackers' trial.

Steve Gold and Robert Schifreen were found guilty of forgery and received fines totalling £1350, as well as having to pay £1000 each in costs.

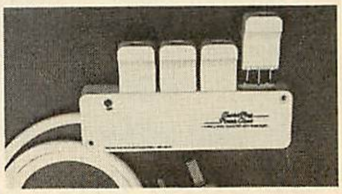
Gold and Schifreen gained access to parts of the Prestel network not normally open to users by using indentity codes (IDs) and passwords belonging to BT employees and Prestel managers.

The way in which the two hackers obtained ID and password information has worrying implications for businesses who want to keep their mail confidential. At least one supplier of telex equipment has used the trial to point out the benefits of paper-based messages against potentially hackable computer stored mailboxes. But the major electronic mail companies all insist that their security is watertight.

The companies we spoke to have either improved their security or feel their current arrangements are more than adequate.

Christine Ott, speaking for Telecom Gold, compared passwords to credit cards – 'You wouldn't leave them lying around.' Telecom Gold, she said, was pleased with the outcome of the trial, feeling it brought the law into line with high technology.

Peter Probert of Micronet explained: 'It lays down guidelines on what is and what is not acceptable, so in that sense we are pleased with the outcome. But Schifreen and Gold were not out to corrupt information. They were trying to draw attention to the problems of security.'



Protection for your micro

Power spikes can wipe your data and damage your equipment, but Masterpiece Products have a couple of items which can make your micro safe.

The Powerclean is a four-way trailing lead adapter with special plugs which you attach to your computer and peripherals.

The Masteradapta is similar except that it plugs directly into the mains socket rather than just having a lead.

The prices are just under £20 and £10 respectively, and more details are available from Masterpiece Cabinets Ltd, Annscroft, Shrewsbury SY5 8AN.

Torch mail order price breakthrough

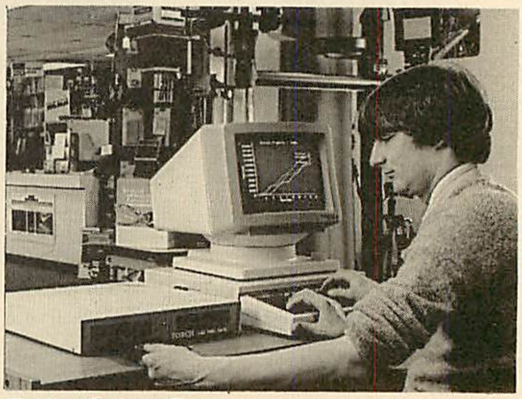
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The Graduate is manufactured by Torch Computers under licence from Data Technologies Ltd. Product names referred to are trademarks of the companies of origin.

A Word arrives

The long-awaited *InterWord* wordprocessor from Computer Concepts should be available in the shops by now.

There is still no date fixed for the database or spelling checker, and *InterBase* will be at least another couple of months.

All the *Inter* programs will work with the Master.

Playing safe with your VDU

People worried about the harmful effects of VDUs will have many of their questions answered in a new, free booklet from the Health and Safety Executive (HSE).

Its main conclusion seems to be that there is little to worry about, suggesting at one point that VDUs give out less radiation than human beings.

The leaflet, called *Working with VDUs*, is available from HSE offices around the country.

Double help with printers

Two micros can be connected to a single parallel printer, or two printers to one micro with the aid of a couple of new devices from C F Terrell.

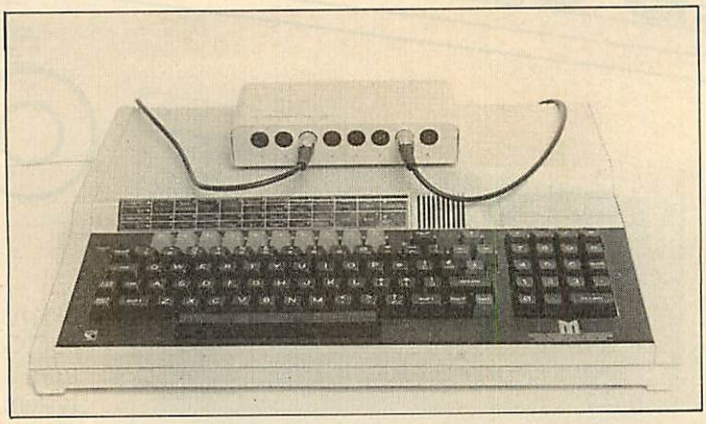
The device for two BBC micros costs £35, and the one for two printers is £38. Details from C F Terrell, (04024) 71426.

Easy database

List Manager from Microtest Ltd is an easy-to-use database with built-in facilities to store, retrieve and print information.

It also allows you to write your own Basic routines to perform calculations on the stored data.

The program is disc-based, and available in 40 or 80 track formats. Details are available from Doug Freeman or Chris Netherton on (0208) 3812 or 3171.



The Compton Soft Switch allows up to eight peripherals, such as modems and printers to be connected to the RS423 port on a Beeb or Master at the same time.

Each of the eight RS423 sockets has a unique software address, so data goes to the correct device. The unit plugs into the user port and costs £165 from Soft Option, Imperial House, Lower Teddington Road, Hampton Wick, Kingston KT1 4EP.

France calling on the Prestel line

by Steve Mansfield

Business people who deal with companies across the Channel – and anyone studying French – will soon be able to take advantage of the French version of Prestel. The service, known as Teletel, is opening dial-up ports in London around mid-June.

Although the pages are all in French at the moment, English language sections may well appear. Much of the service is free, and can be accessed without identity codes and passwords, so it should appeal to Francophiles as much as technophiles.

You can't use standard viewdata software, unfortunately. In France, customers use dedicated 'Minitel' terminals so Aldoda International is producing emulation software for BBC micros. There will be two programs – a full Teletel emulation which runs on the Master, and a cut-down version for a standard BBC B.

No prices have been announced yet. Contact Aldoda International on 01-794 0991.

How to benefit from your Beeb

While the DHSS struggles to put its labyrinthine benefit rules and regulations onto a mainframe, Roy Bailey has had a go on a BBC micro.

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3	Office Master	Gemini	£25	£25	No	*	No	*	*
4	ViewSheet	Acornsoft	—	—	£59.50	£29.95	Yes	Yes	Yes
5	Wordwise Plus	Computer Concepts	—	—	£56.35	—	—	Yes	—

Compiled by Gallup/MicroScope. Contact publisher: Database Publications, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. (0442) 63933. Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411. Gemini, Gemini House, Dinan Way, Exmouth EX8 4RS.

HIGHLIGHTING PROBLEMS

These programs show you how to spool text in *View* and transfer data from the rest of the family

Graham Bell

In contrast to its major rival, *Wordwise*, the *View* wordprocessor cannot spool an ASCII version of a piece of text if it contains any rulers, edit commands, macros, tabs or highlights. A widely-suggested way to overcome this is the use of *SPOOL followed by the SCREEN command, but this inevitably introduces unwanted * and _ signs, control codes and superfluous 'command page' text into the spooled file. No stars for convenience. This article presents an alternative: a Basic program to assemble a file spooler for use with *View*. The spooler masquerades as a printer driver, but sends text to a file rather than to a printer. It can also be used to transfer spreadsheet data from *ViewSheet* to *View* without the use of the rather slow *SPOOL method.

The Basic program (listing 1 on the yellow pages) incorporates a checksum, and this has to be correct before the assembled spooler is saved automatically under the name 'V.ASCII'. Once saved, the spooler should of course be used independently of the Basic program. Although the program is written in Basic I, owners of Basic II can delete all references to the variable 'offset' and utilise O% instead (thus line 170 becomes P% = &400:O% = store). Similarly the OPT FNequb (etc) and PROCoscli calls may be replaced by the new EQU directives and the OSCLI keyword. If the ADFS is in use, then the sub-directory V must be created before the Basic program runs.

The spooler is recommended for preparing any text files for use with another language or application, seven-bit files to be transmitted serially, or files to be used on another computer not fitted with *View*. In fact, it's useful whenever a text file has to be created and the editing facilities of *View* will help. An ASCII (text) file created with the spooler can be *TYPEd on screen or *EXECed, and will appear exactly as the equivalent *View* file would on paper (ignoring the 80-column limit on-screen). Mailmerging with a database becomes possible while using the page layout features which *View* offers, as most database packages demand a purely ASCII file.

To use V. ASCII, load it with the PRINTER command:

PRINTER V.ASCII

then PRINT the document exactly as if a printer were connected. The program prompts for a name for the new file:

SPOOL FILENAME? t.test

Enter a name for the file (t.test in the example), and *View* then spools the document to that file. The spooled version will contain an ASCII 'translation' of the work, with all *View* features appearing as they would on a printed copy (though highlights are ignored).

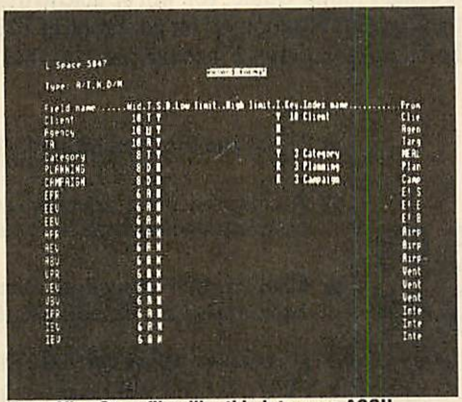
V.ASCII works with *View* A1.4, A2.1, *View* 3, *ViewStore* and *ViewSheet* 1.0 (wherever did the A go?), with any Acorn-compatible DFS or ADFS on any BBC machine capable of running *View*, as well as Electrons. It is compatible with cassettes, too, but only if printing direct from memory (and therefore not with *View* A1.4), as printing from a file would require two cassette files open.

And now a couple of warnings. First, if printing or spooling is to be begun directly after entering *View* (ie, text mode has not been active yet), NEW is necessary before loading any printer driver (this has been cured in *View* 3). Second, Break should not be used while spooling as the spooler does not control the fate of the open spool file. This is the task of the filing system, and they vary: the CFS, DFS 0.9 and its many clones close all files, whereas the Acorn DFS 1.2 keeps the files open. If Break is used, then close any open files with QUIT, and reload V.ASCII. Should interruption be vital, Escape won't cause any of these problems. Finally, the spooler doesn't work with SHEETS.

Modifying the spooler

Enterprising readers with esoteric needs may alter the listed routine, though why anyone should do this is a mystery. Remember, the checksum will be different if you cook up your own version, so get a 'vanilla' version working before creating any exotic flavours.

There are some other approaches to spooling. One obvious change would be to use the printer-on call to open the file. However, on a disc machine this means that if the spooled file is mistakenly given the same name as the input file, Chapter 17 of your latest Restoration bodice-ripper is replaced by an empty file. In the same circumstance, the present routine fails



Turn *ViewStore* files like this into pure ASCII

PROGRAMMING IN BASIC

Another use for this spooler is the writing of assembler code, including the provision of macro and library facilities. Using *View* to write Basic programs involves *EXECing a *View* file into Basic. A point that the manual doesn't stress is that you must toggle format mode off and not use any edit commands.

Using *View* instead of the ordinary line editor has the advantage that a whole section of code can be moved to the end of a program if you feel it should be make into a subroutine or procedure. Names can be searched for and replaced, and line numbers are irrelevant: leave them out and put AUTO at the top of the file instead. The disadvantage is that you lose the interactive nature of Basic, so it is not particularly useful for ordinary programs.

Using the spooler to create text files of Basic assembler programs written in *View* has the added advantage that *View*'s macros are expanded, so common assembler macros can be devised and incorporated into programs. The definitions can be in a separate library file which itself produces no spooled output since it contains only these macro definitions. PRINT <library file> <program file> defines the library macros and expands them into a new spooled version of the program file. Then *EXEC the spooled file into Basic as normal. Parameters can be passed to macros, by including @ in the definitions.

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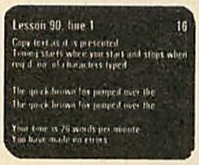


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ViewStore		View
^3^3^3	bold on/off	***
^3^1^3	italic on/off	*–*
^3^1^1	alternate font on/off	*––
^3^1	begin subscript	*–
^3^3	begin superscript	**
^3^3^1	end sub- or superscript	**–

Table 1. Shows highlights in the field list from a *ViewStore* report format file and how they translate into extended highlights in *View* using Graham Bell's spooling program

gracefully with a 'file open' message. A spooler can also be made compatible with SHEETS, but only at the cost of increased complexity. In this instance, the printer-off entry can't be used to close the file as it is called at the end of every page, so devious means must be used to cope with the many different ways of aborting the operation. It's complex and uncivilised, and, to my mind, not worth the added effort.

Transferring data from *ViewStore* and *ViewSheet*

When using the spreadsheet or database, it is often necessary to copy something into a *View* document: a list of names or products, or perhaps a set of profit and loss figures. Both *ViewStore* and *ViewSheet* cater for this need, but in a roundabout way. First, one has to set the format (in *ViewStore*) or the printer windows (in *ViewSheet*) to give the required effect. Then, in *ViewSheet,* open a spool file with *SPOOL <file name>, and use SCREEN. As the spreadsheet is displayed on screen, it is also put in the file. Finally, close the file with *SPOOL. In *ViewStore,* you can most profitably use SELECT, REPORT or LABEL to display parts of the database on screen and put it into the spool file.

This technique has three disadvantages. First, it is a bit complicated. It needs an extra command and you must remember to close the spool file after use. Second, it usually puts unwanted rubbish at the top and bottom of the spooled file. Third, although both *ViewSheet* and *ViewStore* can use highlights, they cannot be transferred to *View* documents in this way.

To allow reports with highlights to be transferred from *ViewStore* into *View,* I have amended the *View* text spooler (V.ASCII) to allow its use with *ViewStore* and *ViewSheet*. To create the new spooler, add the lines in listing 2 to the Basic program in listing 1. Run the program, and this will save the spooler using the name V.VSXFER. Load the spooler into *ViewStore* and *ViewSheet* using PRINTER command (figures 1 and 2). Now any output which would normally be sent to the printer

BASIC	
>***STORE**	Enter *ViewStore*
ViewStore	
Bytes free 29952	
Editing no file	
Screen mode 0	Doesn't need to be mode 0
=>**LOAD CREDIT**	Load CREDITORS database
=>**PRINTER V.VSXFER**	and 'transfer spooler to transfer report to *View*
=>**UTILITY SELECT**	Create Select file containing list of unpaid creditors
SELECT	
List or create select file (L,F)? **F**	
Select criteria? **<Return>**	All records selected
Sort field? **COMPANY**	Sort by company and date
Sort field? **DATE**	
Sort field? **<Return>**	
Key width: **9**	
Ascend or Descend (A,D)? **A**	
Selecting. . .	
Sorting . . .	
=>**UTILITY REPORT**	Print report of unpaid creditors
REPORT	
Use select file (N,Y)? **Y**	
Screen or Printer (S,P)? **P**	Remember V.VSXFER pretends to be a printer driver
Use report format file (N,Y)? **Y**	
Report filename? **REPO3**	Load Report Format File. Note the report format includes some highlighted fields
Send totals to linking file (N,Y)? **N**	
Subtotal field? **COMPANY**	
Subtotal field? **<Return>**	
Single sheets (N,Y)? **N**	Continuous printing
Today's date? **1st June 1986**	
Spool filename? **TEXT3**	Name spool file to put text of report into
=>***VIEW**	Enter *View*
View	
No text	
Editing no file	
Screen mode 0	
Printer default	
=>**NEW**	
=>**LOAD TEXT3**	Load spool file containing text of report
=> **<Escape>**	Enter text mode and note the extended highlights in the report, allowing bold, italics and underline effects

TEXT3 is a 'normal' *View* file and may be edited or inserted into any other document. Note that HT 2 130 may be required above TEXT3 as extended highlights are used.

Figure 1. Transferring reports and highlights from *ViewStore* to *View*. The bold type shows the commands which you should type in

will be spooled to a file. This file can later be LOADed or READ by *View*, and it will contain both text and highlights.

You can transfer plain *ViewStore* text 'printed' using the SELECT, LABEL or simple REPORT utilities. It is worth remembering that the maximum line length in *View* is 132 characters and to use continuous printing rather than individual sheet mode. Use 132 or less as the answer to the 'Printer width (80)?' question, depending what line length you want when the text is transferred to *View*.

Similarly, PRINT can be used in *ViewSheet* to spool the contents of the printer windows, exactly as if they were being put on paper. This includes the highlights, if these are set, for each individual window.

Highlights in *ViewStore* formatted reports

The Printer Driver Generator (distributed with *View* 3, but also available separately for use with early versions of *View* and the Master) includes a facility known as 'extended highlights'. Highlights 1 and 2 work as normal to give underline and bold effects, but if highlight 2 is redefined to give code 130 (instead of its default value of 129), using:

HT 2 130

a whole new set of highlights can be used. '_' is highlight 1 and '*' is highlight 2. However, the HT command can only be used in *View*.

These extended highlights cannot be used with *ViewSheet*. Only the normal highlights (1 and 2) can be employed.

In *ViewStore*, highlights are used only in report definition files. If a pair of highlight characters (^1, ^2, etc) are put in the 'field list' for a particular report line, they will take effect when the report line is printed.

The nine highlights in *ViewStore* are not redefinable: there is no equivalent to *View*'s HT command. In the report definition file field list, ^1 and ^2 are used in place of the default *View* highlights to give underline and bold effects. But in addition, using ^3 will mimic the effect in *View* of highlight 2 after setting it to 130. Refer to the list of extended highlights in table 1. Remember that items in the field list must be separated by commas. So:

^3, ^1, ^3, model, ^3, ^1, ^3, stock, ^1, price, ^1

in the example *ViewStore* database called 'cars' should print the model names in italics, the stock number normally, and underline the price field. However, there are a couple of problems associated with this which are described below (these apply equally to ordinary unextended highlights). In any case, highlights beyond ^3 should not be used with the current printer drivers, and ^2 should not be used together with ^3. One problem which arises with any highlights in *ViewStore* is that, using this field list as an example:

^3, ^1, ^3, model, ^3, ^1, ^3, stock, price

the first group of highlights are sent to the printer immediately before the model name, but the second set are not sent directly after. Rather, they are used immediately before the stock number. This means that, with this report format:

@@@@@@@@@@@ In stock:
@ Price is: £@@@@.@@

not only the model name will be printed in italics (in the first field), but also the text 'In stock:'. A useful technique is to reserve one register to be zero (it is easy to remember: |TZ). This can be placed in selected positions on the format line to force the highlight sequences to be printed in the correct place:

@@@@@@@@@@@ @b In stock: @

The matching field list is:

^3, ^1, ^3,model, ^3, ^1, ^3,|TZ,stock

This will cause a blank space to be printed in the report where @b appears in the format line (because register Z contains 0). Importantly though, the space will be preceded by the highlight codes, so italics will be switched off before 'In stock:' is printed. This can also be useful when it is necessary to cancel one effect and start another immediately. A spacer is necessary between the two groups of highlights which |TZ provides. There is a second problem when using highlights: it is important that all effects are cancelled before the next line is begun. If a set of highlights lies at the end of the line, it will not be implemented. A useful

BASIC	
>***SHEET**	Enter *ViewSheet*
VIEWSHEET	
=>**LOAD D.POLLEN**	Load the example spreadsheet D.POLLEN
=> **<escape>**	Enter sheet mode and look at the data by using the default full-screen window
=>**LW S.WIND1**	Load window definitions. S.WIND1 contains printer windows with highlights set
=> **<escape>**	Enter sheet mode to study and check window definitions. Windows P0, P2 and P3 have various highlights set
=>**PRINTER V.VSXFER**	Load file spooler
=>**PRINT**	
Spool filename? **TEST1**	Spreadsheet windows are spooled to TEST1 instead of being printed
=>***WORD**	Enter *View*
VIEW 2.1	
=>**NEW**	
=>**LOAD TEST1**	Load the spooled spreadsheet data
=> **<escape>**	
=>**PRINTER FX80**	
=>**PRINT**	
=>***BASIC**	

The spreadsheet could be printed directly by installing the FX80 driver into *ViewSheet*, but by spooling it to a normal *View* file, supplementary text can be added, or it can be incorporated into a larger document.

NB: Extended highlights are not suitable for use with *ViewSheet*. If a spreadsheet is spooled and added to a document making use of extended highlights, HT 2 129 must be put at the top of the spreadsheet text, and HT 2 130 at the bottom of the spreadsheet.

Figure 2. How to transfer highlights from *ViewSheet* to *View*. The bold type shows the commands which you have to enter

HIGHLIGHTS HIGHLIGHTED

There are two highlights supported by *View* which can be added to your text using Shift-f4 and Shift-f5. Highlight 1 gives underlined text and highlight 2 provides bold, but to allow your particular printer to switch on these special effects, you will probably need a 'printer driver'.

A printer driver is a short program which is loaded in with the command PRINTER and which converts the ASCII codes produced by the highlights in your text (128 for highlight 1 and 129 for highlight 2) into the stream of codes which, when sent to your printer, will tell it exactly what to do. In effect, your printer and *View* speak different languages and the printer driver program acts as a translator.

On screen, highlight 2 is represented by an asterisk and highlight 1 by an underline character or a hyphen – depending on which version of *View* you have.

Most printers provide a whole variety of special effects, however, and you need to be able to switch these on and off from within *View*. There are two ways of doing this.

First, you can allocate a different code to the desired special effect; for example, to use italics, you might decide on ASCII code 130. That is, you want the code 130 to be sent to your printer driver. To do this from within *View*, you need to redefine one of *View*'s two highlights to produce ASCII code 130, which is done using the embedded command HT. You also need to make sure that the printer driver program you are using knows what stream of codes it must send to the printer to enable italics once it has been given ASCII code 130 by *View* – the printer driver must know what 130 means in the printer's own language.

Another (more flexible) way of using more special effects in *View* is to use 'extended highlights', which can be set up using the *View Printer Driver Generator*. The idea here is to combine highlights 1 and 2 into sequences rather than to redefine the codes they produce. Thus, italics may be enabled by the sequence:

highlight 2, highlight 1, highlight2

The printer driver program would spot that we're not sending one but three highlight codes and would send the appropriate stream of characters to the printer to enable the desired special effect. In practice, this is done by defining highlight 2 to produce code 130 at the start of your text with the embedded command HT 2 130. So the sequence of codes sent by *View* to the printer driver to enable italics would be:

130 128 130

ViewStore allows the use of 10 highlight codes, none of which can be redefined. These can be used, for example, in report format files and are typed in as ^1 to ^9. If you want to use several highlights in a *ViewStore* report file which is to be converted into a *View* file, you will need to use extended highlight sequences (eg, ^3, ^1, ^3, for italics) in the field list of your report format file. Then, using Graham's spooler program, the *ViewStore* report file can be spooled into a *View* file containing the correct extended highlight codes (eg, ^3, ^1, ^3, will become *_*).

technique is to assign 0 to register Z, after the highlights, to ensure they are printed. This line incorporates both these ideas:

Model: @@@@@@@@@@@ @b £@@@@.@@

and:

^3, ^3, ^3, model, ^3, ^3, ^3, |TZ, ^3, ^1, ^3, price, ^3, ^1, ^3,Z:0

This would print the model name in bold, and the £ sign and price field in italics, but cancel italics before the text 'Model:' on the next line. Unfortunately it isn't straightforward but with care you can use these techniques to highlight any sections of the report line.

Once the report format is set up, print the report as usual using the REPORT utility. If a normal printer driver is used, the highlights will take effect and parts of the report will be printed with the desired emphasis. If V.VSXFER is used as the printer driver, the highlights will go into the spooled file. *View* can be used later to incorporate the report into a larger document. Note here that the 'HT 2 130' command will have to be inserted above the report section for highlights.

Summary

V.ASCII is a printer driver which 'prints' text to a file from *View*. Anything which would normally be printed on paper will be spooled to the file. The text in the final 'spooled' file has no special characters such as tabs, highlights or edit commands in it. It can be used with *View*, *ViewSheet* or *ViewStore*.

V.VSXFER is similar, but should only be used for transferring data from *ViewSheet* or *ViewStore* into *View*. The final file may contain highlights from *ViewSheet* printer windows or *ViewStore* reports if desired.

For Graham Bell's listings see the yellow pages index on page 113

VIEWSTORE TIPS

Taking the time to master *ViewStore* is a worthwhile effort. However, it does have some odd little idiosyncrasies which can be annoying if you don't know how to get around them. So here are some tips:

If you are manipulating a large file of some 1500 records or more then always change mode before you perform your sort. In some cases, failure to do so can result in sorted records being left out of your select file. Of course, changing mode has another advantage in that it speeds up the whole operation particularly when searching and sorting records.

Another tip when searching records is to use wildcard characters. Remember that you can use them before and after a search string, ie, *FORD* will search for all records having FORD within them.

Don't use them in your records as part of an entry otherwise a wildcard search could become confused.

You may have noticed that occasionally, halfway through entering a record, the 'END' message is displayed by *ViewStore* along with a bell, although you still have a large amount of memory available for new records. This occurs because you left the record entry half way through to do another task (eg, change database header). When you leave a record entry it has to shut the current record – it does this adding the extra number of bytes per record previously specified when the database was created to its existing, unfinished length. When you come to re-open the record you have only these 'extra' bytes left, so the rule is simply to always complete a record entry before moving on.

Problems can occur if you have a couple of indexes open for updating during entry. At such times updating these indexes can take a matter of seconds which for fast typists can be infuriating as data is 'lost' on entry. In such cases it is wise to switch the indexes off (using the record format) and then to update them when the record entries are complete.

ACORN FORUM

In this forum for owners of Acorn micros, Mike Barwise presents a simple way of setting up printers and an OSWORD emulator for the Atom

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PRINTER SET-UP

Here is a neat program (listing 1 on page 180) by John Dalton from Newcastle, to set up Epson-compatible printers (see figure 1) – at last you can display your database in those elusive upside-down inverse italic superscript Japanese characters!

I leave it to John to explain how to use the program . . .

Much applications software nowadays needs the printer to be set up before use – for example, with databases or spreadsheets. This usually means rummaging through the printer manual searching for little-used codes such as margin settings or condensed superscript, and so on, which can be very error-prone as well as being time-consuming.

With this in mind I have written a small program which is entirely menu driven and allows quite complicated printer settings to be entered in a few seconds. The program was written on a BBC B with Acorn DFS 1.20.

To operate the program use the up and down cursor keys to run up and down the menu. Select a particular printer code by pressing the Return key. As a reminder that you have selected this code an asterisk is printed to the left of your choice. To check that the printer has accepted the codes press the Tab key, which will print out the character set several times. To exit the program press the Escape key.

The program as it stands is configured for my printer which is a Canon PW-1080A but since this is Epson-compatible, the codes should apply to all Epson printers except the NLQ ones.

In any case I have written the program in such a way that the codes can be easily changed or altered to suit personal tastes, which is done by altering the data statements between lines 1040-1360. There is only room for 16 sets of printer codes – this is due to the constraints of the mode 7 screen, but 16 should be enough for most applications.

As an example for entering the data, the printer code for superscript is:

ESC "S" + 0

which translates to:

VDU 1, 27, 1, 83, 1, 0

for the BBC micro. Since the program will handle the 1s and 27s, only the 83 and the 0 are of importance. Therefore enter:

1220 DATA Set superscript on

1230 DATA 83¦0*

The token separators ¦ and * are purely arbitrary and only tell the program when to split the numbers up (¦) and when the data finishes (*).

Another example is where a value is expected such as in setting up the line spacing. The printer code for setting line spacing to n/72 inches is:

ESC "A" + n

which translates to:

VDU 1, 27, 1, 65, 1, n

for the BBC micro. Here the 65 and the n are of importance. Enter:

1300 DATA Set line spacing. (n/72) inch.

1310 DATA 65¦n*

In this case having the lower case 'n' in the data statement will instruct the program to prompt you for an input from the keyboard.

Another point to note is that the first data statement should be the printer reset code (in this case ESC "@" or in the program DATA 65*), because the program sends this code to the printer when it is first run, cancelling any previous settings. It is always available on the menu in case any mistakes are made when setting up the printer . . .

The program has some very neat touches. The printer control codes are stored in DATA statements at the end of the program: to allow users to include whatever different numbers of code sequences they want, the program starts by establishing the number of DATA statements present.

Some codes (for example, set margin) include a parameter (n) in the DATA statement which causes a prompt on execution for a one-time value.

This is a nice piece of control coding, and elicits some well-deserved beverage tokens!

```
 !"£$%&'()*+,-./012345678
pqrstuvwxyz{|}~ !"£$%&'()
abcdefghijklmnopqrstuvwxy
RSTUVWXYZ[\]^_`abcdefghij

 !"£$%&'()*+,-./012345678
pqrstuvwxyz{|}~ !"£$%&'()
abcdefghijklmnopqrstuvwxy
RSTUVWXYZ[\]^_`abcdefghij

 !"£$%&'()*+,-./0123456789:;<=
!"£$%&'()*+,-./0123456789:;<=>
"£$%&'()*+,-./0123456789:;<=>?

 !"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJ
EFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnc
jklmnopqrstuvwxyz{|}~

 !"£$%&'()*+,-./012345678
pqrstuvwxyz{|}~ !"£$%&'()
abcdefghijklmnopqrstuvwxy
RSTUVWXYZ[\]^_`abcdefghij

 !"£$%&'()*+,-./012345678
pqrstuvwxyz{|}~ !"£$%&'()
abcdefghijklmnopqrstuvwxy
RSTUVWXYZ[\]^_`abcdefghij

 !"£$%&'()*+,-./012345678
pqrstuvwxyz{|}~ !"£$%&'()
abcdefghijklmnopqrstuvwxy
RSTUVWXYZ[\]^_`abcdefghij

 !"£$%&'()*+,-./012345678
pqrstuvwxyz{|}~ !"£$%&'()
abcdefghijklmnopqrstuvwxy
RSTUVWXYZ[\]^_`abcdefghij

 !"£$%&'()*+,-./012345678
pqrstuvwxyz{|}~ !"£$%&'()
abcdefghijklmnopqrstuvwxy
RSTUVWXYZ[\]^_`abcdefghij

 ! " £ $ % & ' ( ) * + .
H I J K L M N O P Q R S
p q r s t u v w x y z {
9 : ; < = > ? @ A B C D E
a b c d e f g h i j k l
* + , - . / 0 1 2 3 4 5
R S T U V W X Y Z [ \ ]
z { | } ~

 !"£$%&'()*+,-./012345678
pqrstuvwxyz{|}~ !"£$%&'()
abcdefghijklmnopqrstuvwxy
RSTUVWXYZ[\]^_`abcdefghij
```

Figure 1. Different type easily achieved

£5

OSWORD BY ANY OTHER NAME

Richard Darby from Welwyn, Herts, has sent me a very interesting Atom routine (listing 2 on page 181) which provides a function similar to the BBC micro's OSWORD (talk to FDC call). While it will only work with the Intel 8271 controller, it's still of considerable inter-

est as it allows the disc system to be used as more than just a super-fast 'cassette' or program loader. I hope to provide a list of function entry addresses for the Atom 1770 FDC (ADOS) in a future Acorn Forum in *Acorn User* in the near future.

Meanwhile, I pass you over to Richard for a description of the mechanism of his routine . . .

This routine emulates the OSWORD call on the BBC micro. A data block must be set up to contain all the information needed by the FDC to access the disc.

The address of this block may be specifically chosen, or it could be dimensioned from Basic – 20 bytes should be more than enough for our purposes (for example, DIM B20). The contents of the data block are:

Base address Contains the drive number, usually 0 unless you have another drive (eg, ?B=0).

Base + 1 to 4 Start address in memory where data is to be transferred to or from. Four bytes are reserved but only two needed for the address (eg, B!1+#8300). Note, the minimum amount of data transferred is one sector or 256 bytes.

Base + 5 Number of parameters needed by the command (eg, B?5=3).

Base + 6 Command byte. For most commands, bit 6 should be set, ie, op code for the command plus #40, so Read data becomes #53; Write data becomes #4B, (eg, B?6=#53).

Base + 7 1st parameter.

Base + 8 2nd parameter.

Base + 9 3rd parameter.

The parameters required for reading and writing are:

Parameter 1 Track No. (logical) (eg, B?7=2<track 2>).

Parameter 2 Start sector No. (logical) (eg, B?8=0<sector 0>).

Parameter 3 Bits 5 to 7 indicate sector size (bit 5 always set for 256 byte sectors). Bits 0 to 4 indicate number of sectors to be processed (eg, B?9=#24 <4 sectors>).

Having set up the data block, the base address is passed to the FDC access routine via the variables X and Y, which contain respectively, the low and high byte of the data block base address.

If the routine is used from within a machine code program the X and Y registers should be set before the JSR is performed.

LINK (or JSR) to the start address of the routine which then passes the command and parameters in the data block to the floppy disc controller causing it to access the disc. On return from the routine the completion code will be found in the byte following the last parameter byte in the data block.

If all is well, the completion code is zero; if non-zero, the completion code will give the reason for failure. Most codes are explained in the Disc Pack manual as disc errors, one exception being #12 which indicates a write protected disc.

This routine was written for use with the original Atom DOS and supports all 8271 commands. Detailed information on commands, parameters and their uses is best obtained from the 8271 data sheets. The use of BBC micro protocol allows easy translation of Beeb programs for use on the Atom.

Helpful articles on the use of the BBC micro OSWORD call for access to the floppy disc controller (FDC) chip can be found in the May 1984 (p87) and October 1984 (p81) issues of *Acorn User* . . .

I would like to point out the very neat method by which Richard has overcome the assembler targetting problem of the Atom. His use of offsets to labels in absolute instructions such as JMP allows the code to be assembled to an execution target different from the object code storage point.

This allows you to create code for an EPROM at #A000, for example. Well done Richard! A not insignificant emolument is heading your way as a reward.

```
 10REM ***********************************************
 20REM *    PROGRAM TO EMULATE BEEB OSWORD CALL      *
 30REM *   WHICH ALLOWS DIRECT ACCESS TO 8271 FDC    *
 40REM *                                             *
 50REM *        (C) R.J.DARBY  DECEMBER 1985         *
 60REM ***********************************************
 70 DIM LL8,C5
 80 F=0;@=4
 90 IN.''"ASSEMBLY ADDRESS"S
100 IN.'"OFFSET? (Y/N)"$C
110 IF $C ="N" G.140
120 IN.'"OFFSET ADDRESS"F
130 F=F-S
140 F.N=0TO8;LLN=£2600;N.
150 F.N=1TO2
160 P=S
170[
180 STX£D7          ;STY£D8     \STORE BASE ADDRESS OF DATA BLOCK
190 LDA@(LLO+F)%256 ;STA£D5     \STORE ADDRESS OF RTS
200 LDA@(LLO+F)/256 ;STA£D6
210 LDA£EE          ;PHA        \PRESERVE CURRENT DRIVE NO.
220 LDY@0
230 LDA(£D7),Y   ;STA£EE        \GET DRIVE NO.
240 LDY@5        ;CLC
250 LDA(£D7),Y   ;ADC@6         \GET NO. OF PARAMETERS
260 STA£A4       ;INY           \ADD 6 AND STORE
270 LDA(£D7),Y   ;STA£AD        \GET COMMAND BYTE, STORE
280 AND@£3B      ;BEQ LL7       \SCAN DATA?
290 LDA@£1C      ;BIT£AD        \FORMAT?
300 BEQ LL7
310 LDA(£D7),Y   ;AND@£30
320 CMP@£30      ;BEQ LL6       \SPECIAL REGESTERS?
330 LDA(£D7),Y   ;AND@£12
340 CMP@£12      ;BNE LL1       \READ?
350 JSR£E792     ;JMP LL2+F     \INSTALL READ NMI ROUTINE
360:LL1 LDA(£D7),Y;AND@£0A
370 CMP@£0A      ;BNE LL3       \WRITE?
380:LL7 JSR£E796                \INSTALL WRITE NMI ROUTINE
390:LL2 LDY@1    ;SEC
400 LDA(£D7),Y   ;SBC@1         \SEED TRANSFER ROUTINE WITH
410 STA£F6       ;INY           \SOURCE/DEST. ADDRESS
420 LDA(£D7),Y   ;SBC@0
430 STA£F7
440:LL3 JSR£E77A;BNE LL6        \IS DRIVE RUNNING?
450 JSR£E75B                    \LOAD HEAD
460:LL6 LDY@6    ;LDA(£D7),Y    \GET COMMAND BYTE
470 JSR£E7D2                    \LOAD COMMAND BYTE
480:LL5 CPY£A4   ;BEQ LL4       \LOAD PARAMETERS
490 INY          ;LDA(£D7),Y
500 JSR£E809     ;JMP LL5+F
510:LL4 JSR£E226:JSR£E7E4       \GET COMPLETION CODE
520 INY          ;STA(£D7),Y    \STORE IN DATA BLOCK
530 PLA          ;STA£EE        \RESTORE DRIVE NO.
540:LLO RTS
550]
560 N.;P.''"LINK ADDRESS £"&S+F
570 E.
```

Listing 2. Richard Darby's OSWORD call emulator for the Atom

Listig 1. Sets up Epson-compatible printers

```
   10 REM Acorn Forum
   20 REM Printer style selector
   30 REM by John Dalton
   40 REM for BBC B/B+/M
   50 REM (c) Acorn User July 1986
   60 :
   70 ON ERROR GOTO 950
   80 RESTORE:I%=0
   90 REPEAT READ a$,a$
  100 I%=I%+1:UNTIL a$="END"
  110 item%=I%-2
  120 MODE 7
  130 VDU 23,1,0;0;0;0;
  140 PROCinit
  150 FOR I%=0 TO 1
  160 PRINTdb$"  Printer Command Selecto
r"
  170 NEXT
  180 PRINTTAB(1,22)bd$"Press <Return> t
o make selection"
  190 PRINTTAB(1)bd$"<TAB> to test print
, <ESC> to end"
  200 VDU 28,0,21,39,3
  210 FOR I%=0 TO item%
  220 PRINTTAB(0)yl$TAB(4)"("CHR$(I%+65)
")."mg$" "a$(I%,0)
  230 NEXT
  240 PROCinput(0)
  250 Y%=0:X%=2
  260 REPEAT
  270 up%=FALSE:down%=FALSE
  280 VDU 31,X%,Y%,135,93,31,X%+6,Y%,91
  290 a$=GET$
  300 IF a$=CHR$&D PROCinput(Y%)
  310 IF a$=CHR$9 PROCtestpiece
  320 IF a$=CHR$&8B AND Y%>0 up%=TRUE
  330 IF a$=CHR$&8A AND Y%<item% down%=T
RUE
  340 IF up% OR down% VDU 31,X%,Y%,32,32
,31,X%+6,Y%,133
  350 IF down% Y%=Y%+1
  360 IF up% Y%=Y%-1
  370 UNTIL FALSE
  380 END
  390 :
  400 DEF PROCinput(I%)
  410 VDU 28,1,21,39,19,12
  420 j$=a$(I%,1)
  430 VDU 2,1,27
  440 J%=1
  450 REPEAT
  460 f$=""
  470 REPEAT
  480 d$=MID$(j$,J%,1)
  490 IF ASC(d$)>47 AND ASC(d$)<58 f$=f$
+d$
  500 IF d$="N" VDU 3:f$=FNspec(I%):VDU
2
  510 J%=J%+1
  520 UNTIL MID$(j$,J%,1)="¦" OR MID$(j$
,J%,1)="*"
  530 F%=VAL(f$)
  540 VDU 1,F%
  550 UNTIL MID$(j$,J%,1)="*"
  560 VDU 3
  570 CLS
  580 VDU 28,0,21,39,3
  590 IF I%=0 FOR H%=1 TO 15:PRINTTAB(1,
H%)" ":NEXT ELSE
  600 PRINTTAB(1,I%)"*";
  610 ENDPROC
  620 :
  630 DEF FNspec(I%)
  640 PRINTa$(I%,0)
  650 VDU 23,1,1;0;0;0;
  660 INPUT"Enter Value >"g$
  670 VDU 23,1,0;0;0;0;
  680 =g$
  690 :
  700 DEF PROCtestpiece
  710 VDU 2
  720 *FX 3,10
  730 FOR D%=1 TO 3
  740 FOR A%=32 TO 126
  750 PRINTCHR$A%;
  760 NEXT
  770 NEXT
  780 PRINT'
  790 *FX 3,0
  800 VDU 3
  810 ENDPROC
  820 :
  830 DEF PROCinit
  840 *FX 4,1
  850 DIM a$(item%,1)
  860 RESTORE
  870 FOR I%=0 TO item%
  880 READ a$(I%,0),a$(I%,1)
  890 NEXT
  900 yl$=CHR$131:mg$=CHR$133
  910 bd$=CHR$132+CHR$157+CHR$131
  920 db$=CHR$141+bd$
  930 ENDPROC
  940 :
  950 REM Error Handling Routine
  960 ON ERROR OFF
  970 *FX 4,0
  980 *FX 3,0
  990 VDU 3,26,12
 1000 IF ERR<>17 REPORT:PRINT" at line "
;ERL
 1010 IF ERR=17 PRINT"Printer Set"
 1020 END
 1030 :
 1040 DATA Reset Printer to Default
 1050 DATA 64*
 1060 DATA Set NLQ on
 1070 DATA 40*
 1080 DATA Select Elite Style
 1090 DATA 33¦1*
 1100 DATA Select Condensed Style
 1110 DATA 33¦4*
 1120 DATA Set Emphasised printing on
 1130 DATA 69*
 1140 DATA Set Double Strike on
 1150 DATA 71*
 1160 DATA Select Italic Style
 1170 DATA 52*
 1180 DATA Set Underlining on
 1190 DATA 45¦1*
 1200 DATA Double Width Printing
 1210 DATA 87¦1*
 1220 DATA Set Superscript on
 1230 DATA 83¦0*
 1240 DATA Set Subscript on
 1250 DATA 83¦1*
 1260 DATA Select British Character set
 1270 DATA 82¦3*
 1280 DATA Set Uni-directional printing
 1290 DATA 85¦1*
 1300 DATA Set Line Spacing (n/72)in
 1310 DATA 65¦n*
 1320 DATA Set Left Margin (n)
 1330 DATA 108¦n*
 1340 DATA Set Right Margin (n)
 1350 DATA 81¦n*
 1360 DATA ***,END,***
```

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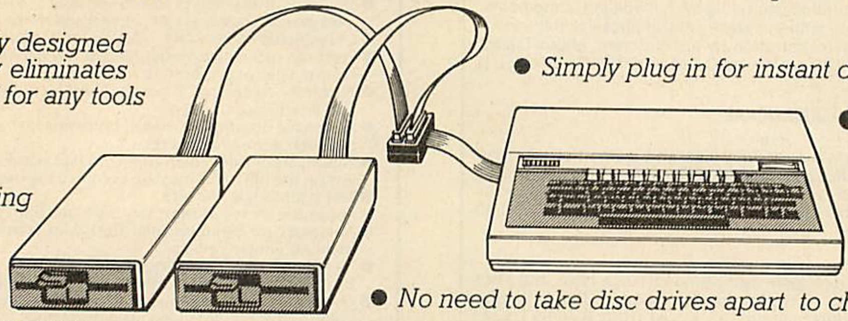
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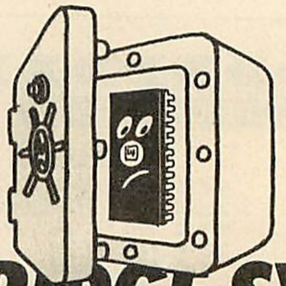
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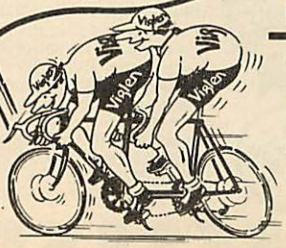
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■ **BBC Model B,** OS1.2, Acorn DFS, disc drive, Microvitec 1451 colour monitor, 50 discs, Acornsoft Logo, joystick, extras, excellent condition, £620. Cambridge 811901.

■ **Expressoft,** 126 Lady Margaret Road, Southall, London. Educational software for the BBC micro featuring top quality graphics and sound. Before ordering send SAE for details.

■ **Print** your *SPOOL files Sideways, eg, spreadsheets on one piece of paper. Send £7.50 cheque to: R Bakker, Dahloastr. 33, 1616 EA Hoogkarspel, Holland. Please state 40/80 track.

■ **BBC B** Cumana disc drive, *Wordwise, View,* Philips Green screen monitor, software, etc. Cost over £900 new, accept £450. Will consider splitting. Tel: 01-583 0244 or 01-482 1188 evenings.

■ **Diagram** output (Sallen & Key, Delyiannis Friend) plots of S-plane phase, attenuation & bode. Epson FX80 compatible, help file, *Wordwise* compatible. Send £25 (40/80t) to: Brainsoft, Middle Huish, Instow, N Devon EX39 4LT.

■ **BBC OS1.2** as new £170; Dacom modem DSL 2123 £130; Dragon 32k + PSU £40; some Nascom Boards. Carriage extra. Tel: Phil Watson, Oakley 2867.

■ **BBC microcomputer:** Acorn DFS1.2, Basic2, OS1.2, £250. Plinth £6. Watford disc RAM £17. The lot £270. Tel: Hemel Hemstead (0442) 45782 after 6pm.

■ **Dictionary:** check your text with this menu-driven program for *View/Wordwise,* expandable from the 10000 words supplied. **Account:** excellent program to handle your bank account, with simple data input and printer output for chequebook, credit and debits. Automatic standing order facility. £8 each disc, £14 the two. Polarsoft, 9 Grayshot Drive, Blackwater, Surrey GU17 0EW.

■ **Sideways RAM.** 16k – £15, 32k – £25. Simple fitting, no soldering, r/w protect and s/w as standard. User port switch 2-up-to-6 way from £19. Printer Selector switch switch 2-up-to-12 way from £20. RS423 selector switch 2-up-to-12 way from £15. Leads made to your specification. For catalogue send addressed envelope to: G J Eida, 14 Hurstwood Avenue, Bexley Kent DA5 3PH.

■ **Millennium** – The wargamer's dream come true. Simultaneous play on two BBC Bs linked via modified RS423 cable. Interstellar strategy game with three scenarios × three victory levels. Also one computer play. Disc £8.95 (state 40/80 track): with cable £12.95. Cheque/PO to: Falconsoft, PO Box 141, Welling, Kent DA16 2EB.

■ **Convert** your 80 track drive to 40/80 switchable. MKII unit (cased) simply plugs in, £18. MKI kit – as above, but requires soldering iron – fits inside drive, £10. Power supply unit for 2 disc drives, top quality, complete with plugs and leads, £37. 80/85 assembler, 2 pass, full instructions. Please state 40 or 80 track, £20. All prices include p&p. Dept A5, Magus Electronics, 33 Pool Lane, Winterley, Sandbach, Cheshire CW11 0RZ. Tel: (0270) 582748.

■ **Two powerful programs** (BBC B, single density). DISC CATALOGUER: reads discs one after another, stores records in database index. Disc free space, file type, sort, search, edit, add comment. YEAR PLANNER: machine code, four different screens, smooth up/down scrolling through year and calendar, mark calendar (or automatic), write text anywhere in day box, screen scribble pad. Each £7.95 (40/80 track disc). Toto Software, 24 Hazel Bank, Milton of Campsie, Glasgow G65 8JG.

■ **Plotter: A4,** 0.002 inch step size. £180. Send sae for full details of this and/or various small items of software. T K Boyd, Seaford College, Petworth, W Sussex. Tel: (024368) 3728.

■ **EPROM programming service,** very low cost. Also Basic and machine code programs entered into ROM. Disc and cassette back-up service also offered. Send SAE for details to Microlab, 16 Mellowfields Road, Laughton, Sheffield S31 7YW.

■ **Printer for BBC,** 24 column matrix type. Complete with interface cable, till roll, mains adapter, £20.50 including p&p. Several units available. Tel: (0582) 581229.

■ **Variable mains** power controller up to 1Kw. Completely optically isolated and program controlled from your user port. Made from inexpensive and easy-to-get parts. Circuit and constructional details £3.50 or SAE for ready-built units. P Robinson, 168 Firwood Avenue, Urmston, Manchester M31 1PN.

■ **For sale** BBC B+ 128, purchased Xmas, still under guarantee, also acoustic modem for Prestel & Micronet £400. Wanted, C/Basic and compiler for BBC. Also disc drive suitable for Lynx 128 computer and software, languages, CP/M, etc. Tel: John, Orpington 37955.

■ **Are you an FRPG'er?** Do you want a tape program super-protected? Write with SAE to Obelisk, Hare & Hounds House, Charlton, Andover, Hampshire for a free catalogue of role-play programs and protection details.

We must remind advertisers that we cannot carry advertisements which incite readers to break the protection and therefore copyright of commercial software

■ **BBC regulated** power supplies. Twin channel, each rated 1 Amp, 5, 9, 12 volts. Price £65.50 total. Orders to PMF Designs Ltd, PO Box 5, Romford, Essex RM3 7LH.

■ **For hire.** BBC and Amstrad computers and peripherals. Computer Hire Services, 294A Caledonian Road, London N1 1BA. Tel: 01-607 0157 or 01-997 6457.

■ **Problems?** R-SOFT utilities can help you! **1. How-to:** An essential collection of software and instructions for frustrated new disc owners who want to move their programs to disc. **2. Nutcrackers:** tape2tape + tape2disc + disc2disc + disc2tape. **3. Rompull** and **Tapedump. 4. Automatic Disc Menu:** Includes a sideways RAM version, can boot from ROM, works with 2nd 6502. **5. Autosol:** Will automatically boot your Solidisk with a preselected list of ROMs. **6. SWROM*:** puts your Basic/machine code programs in ROM format. **7. RFS-Generator:** Generates ROMs for the *ROM filing system. This does not use DFS workspace and is an ideal tool to run nasty programs from disc. All above packages £5 each; **How To + Nutcrackers:** £9. **D-Master:** Superb disc copier (is unprotected): £7. Many other utilities: Send for our list (SAE please). R-SOFT, 22 Marriotts Close, Felmersham, Bedford MK43 7HD. Tel: (0234) 781730.

■ **BBC B+ 128k.** Compshop conversion, £395. Phone Andy on (0582) 67784 after 6pm.

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Please include your cheque for £11.50 (inc. VAT) made payable to Redwood Publishing (please note: no POs; cheques only). This is the standard fee. Don't forget your name, address *and* phone number. Send cheque plus form to Acorn User Small Ads, 141-143 Drury Lane, London WC2B 5TF. Please print clearly.

ACORN USER'S

DIARY

Getting your Shogo kit

Good morning all you couch potatoes! You tubers gone made, you VDUers and vidiots, the season of show-going is here again. And as you dust off the gear that has lain idle since Ascot, we thought you'd like some tips on how to go about it all.

First of all, find out where you're going. Sounds simple doesn't it, but it's amazing how many people end up at art exhibition shows in the Barbican Centre, rather than computer shows in the Barbican Exhibition Halls. Golden Lane is the road you want.

Next, come early. To arrive at midday is about the worst time possible, and means you'll end up in a queue (and no doubt it'll be raining). And don't forget to bring a brolly, 'cause it'll be raining anyway.

Don't wear tall hats. Remember, the Barbican was originally designed as a car park. Also, start your Summer dieting a bit early. The Barbican is nicknamed the Baked Bean Can, and you can end up feeling like a sardine after you've been.

Bring a packed lunch or better still, eat before you come.

And remember a cassette recorder so you can prove to yourself that you really did hear what was said.

A small pair of binoculars will suffice so you can see over the crowds at the stands pushing out disc drives, printers and monitors like they was going out of fashion.

Finally, plenty of cash. Show bargains are never repeated (until the next show).



First, know where you're going

Sound advice

And now a few words for the poor beleaguered souls on the stands . . . ear plugs to drown out the Scott Joplin tunes that sounded cute on the first day . . . Odour Eaters and Mum roll-ons you can lend to the smelly reps on the stand next door . . . American Express card if you plan to eat in the Barbican restaurant . . . shooting stick to sit down on when you decide you don't want to eat and find there are only five chairs in the bar . . . patience for when you try to get served at the bar . . . and last but not least, more patience for when you get back in there, the world starts spinning and you realise there're still three days to go.

Terrorism

And now for all the snivelling little brats who love to cause chaos on stands, here're are some tips. Remember the key sequence to set black text on a black background is:

<CTRLSA@@@@>

In other words, hold down the CTRL key and type in SA@@@@. For flashing between purple and green, use:

<CTRLSAZ@@@>

Typing in FIELD 27 in early versions of *View* sets the Escape key up as Tab – get out of that one if you can! (*View 3* gives you a 'Frump!'.) Typing in Daytona in early *Views* gives you the author. For the more subtle readers, try typing in 'wheelchair'.

Masters can be locked up by setting the key repeat really short in the configure program.

*Help

For harassed stand people, the key sequence for white on black is:

<CTRLSA@@@>

The only way out of FIELD 27 is Break, followed by OLD.

For Masters, make sure you have a !BOOT file set up to reset your configure status, or else reset by pressing R while you turn the machine on.

Stand guide

And now for a quick tour of the stands: Look out for bare legs on the *Acorn User* stand – that's how to identify Nick Evans and Chris Drage. Joe Telford will have the longest beard. You'll know Editor Tony Quinn because he won't ever be there. David Acton will be doing all the work, Bruce Smith will be avoiding it.

- Best bar companion: Cliff Musson.
- Best person to talk to if you've got two hours to kill: BBC's David Atherton.
- Best stunt man: Commotion's Tim Coote.
- Best baby minder: Acorn's Dave Bell.
- Biggest nerve: anyone showing an Atari.

Sharp idea

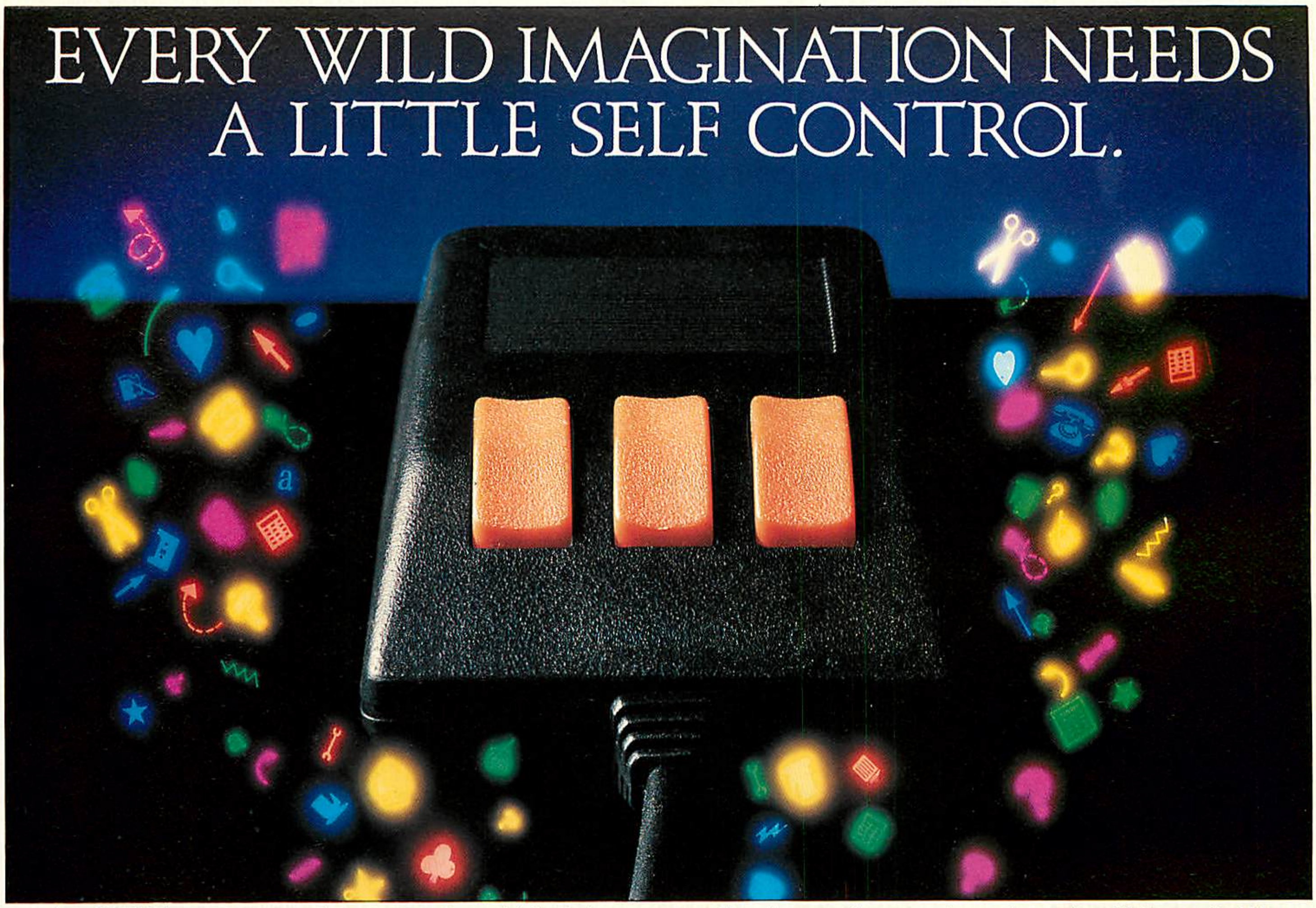
Free Swiss Army knives with discs from Technomatic, well I never! Wonder if they're a new computer users, version with a disc hole puncher and ROM plucker built-in?

News summary

- Wild Vision has put a new word into the computer language with kit to study foot pressure patterns – footware.
- Did you see that WYSIWYG is in the latest supplement to the Oxford English Dictionary? Wonder if blitter made it? Is it true that Atari wants to o-blitter-ate the Amiga?
- And a bit of bad taste to finish: anyone got a geiger counter for the BBC micro? (Swap for an unused geikuney counter.) Have you heard that Ready Brek adverts are being used in Soviet documentaries about Sellafield? Is it true that BBC micros give off more radiation than Chernobyl?

Latest Acorn joke

The R&D lads are walking around holding empty RISC second processor boxes crying: 'There's no ARM in it!'



As a BBC Micro user, you enjoy some pretty sophisticated equipment.

So it's a pity if you are still missing that sophisticated, positive control your equipment deserves.

There's not much joy in a joystick, and keyboards can be all fingers and thumbs. Frustrating, especially when your imagination is much faster than your fingers!

What you need is an AMX Mouse.

Already thousands of BBC Micro users have adopted an AMX Mouse and wouldn't be without it.



We didn't claim it was 'the best input device'. The press said it for us.

In fact it has received outstanding critical acclaim, and no wonder!

The AMX Mouse brings to BBC Model B, B+ and Master 128 users, the same freedom and versatility which has, up to now, been the exclusive province of much more expensive computers.

In fact, it's no surprise that nearly all the new 16 bit 'State of the Art' computers now come with a Mouse as standard. Proof, if proof were needed, that the Mouse is here to stay.

The AMS range of Mouse software includes, AMX Art, AMX Utilities, AMX Pagemaker, AMX Super Art/Rom, AMX Paintpot, AMX Desk, AMX Data Base, AMX 3D Zicon, AMX XAM, and to be released in summer '86 AMX Spread Sheet.

There is also a growing list of programs available from other leading software houses, which utilize the Mouse, including, Colour Art from Watford, Mini Office II from Database, Novocad from Technomatic, Icon Master from Beebug, Compas Starter CAD system from British Thornton, CAD Soft from CAD Soft, Solidesk from Solidisk, and Mode 7 Art from Tubelink and of course View and Wordwise are also compatible, many more titles will be available soon.

Now there are three great ways for you to get into a perfect Mouse Environment!

AMX Super Art & Super Rom (Mouse, Keyboard & Joystick compatible) £49.95.

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Both AMX Art in mono and Super Art in colour are ideal for true Epson compatible printers and AMX Super Art is also compatible with Integrex and Okimate colour printers.

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